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WAR MACHINE

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The Battle of Surigao Strait

Warspite in Action

Bismarck in Action

Armed Forces of the World: Israeli Army and Navy

'Ten Go' Kamikaze

A fully illustrated guide to battleships of World War II

WAR MACHINE

Volume 2 **Issue 18**

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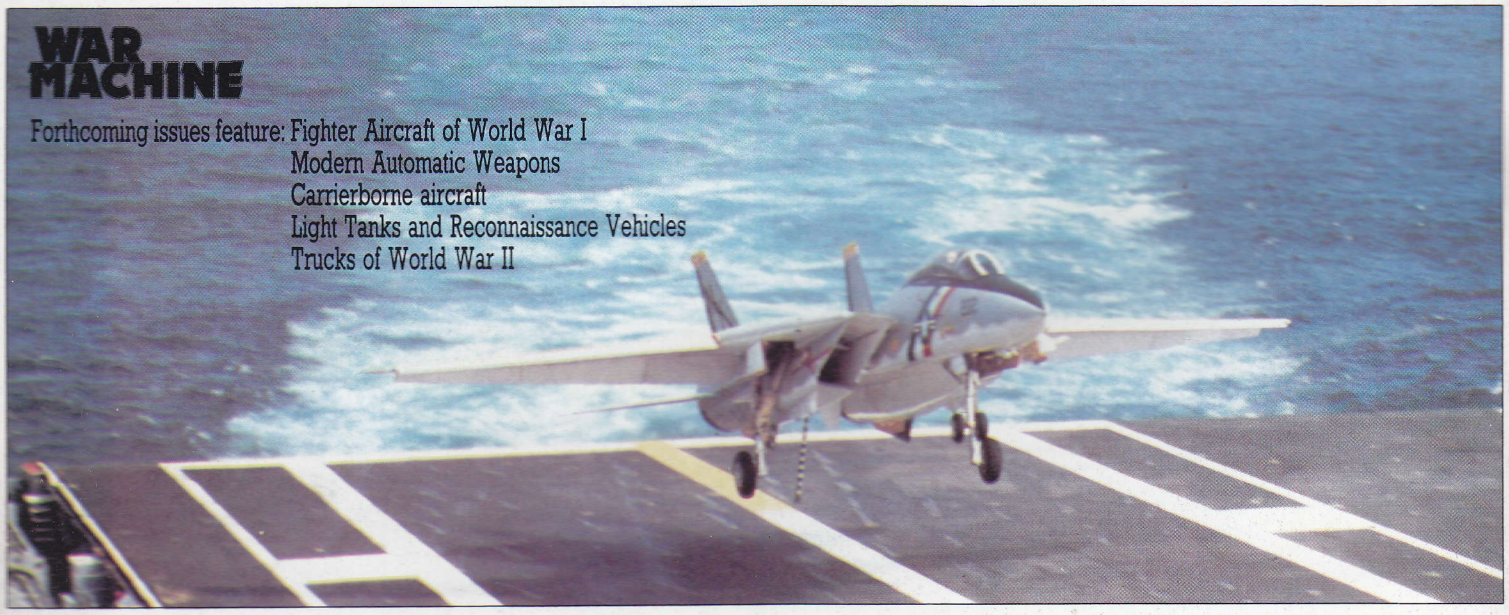


Forthcoming issues feature: Fighter Aircraft of World War I
Modern Automatic Weapons
Carrierborne aircraft
Light Tanks and Reconnaissance Vehicles
Trucks of World War II

Battleships of World War II

The only surviving operational battleships are the World War II 'Iowa' class. Here USS New Jersey *is seen in 1969 during her second tour of duty on the 'gun line' in Vietnam. In 1983 she was sent to the Lebanon to lend support, but saw no action.*

Gunpower has dominated fighting at sea since the days of Sir Francis Drake. While the armoured colossi of 1939 bore no resemblance to Nelson's* Victory*, they served the same purpose: to destroy the enemy with their guns. World War II, however, was to see great changes in the role of the battleship.

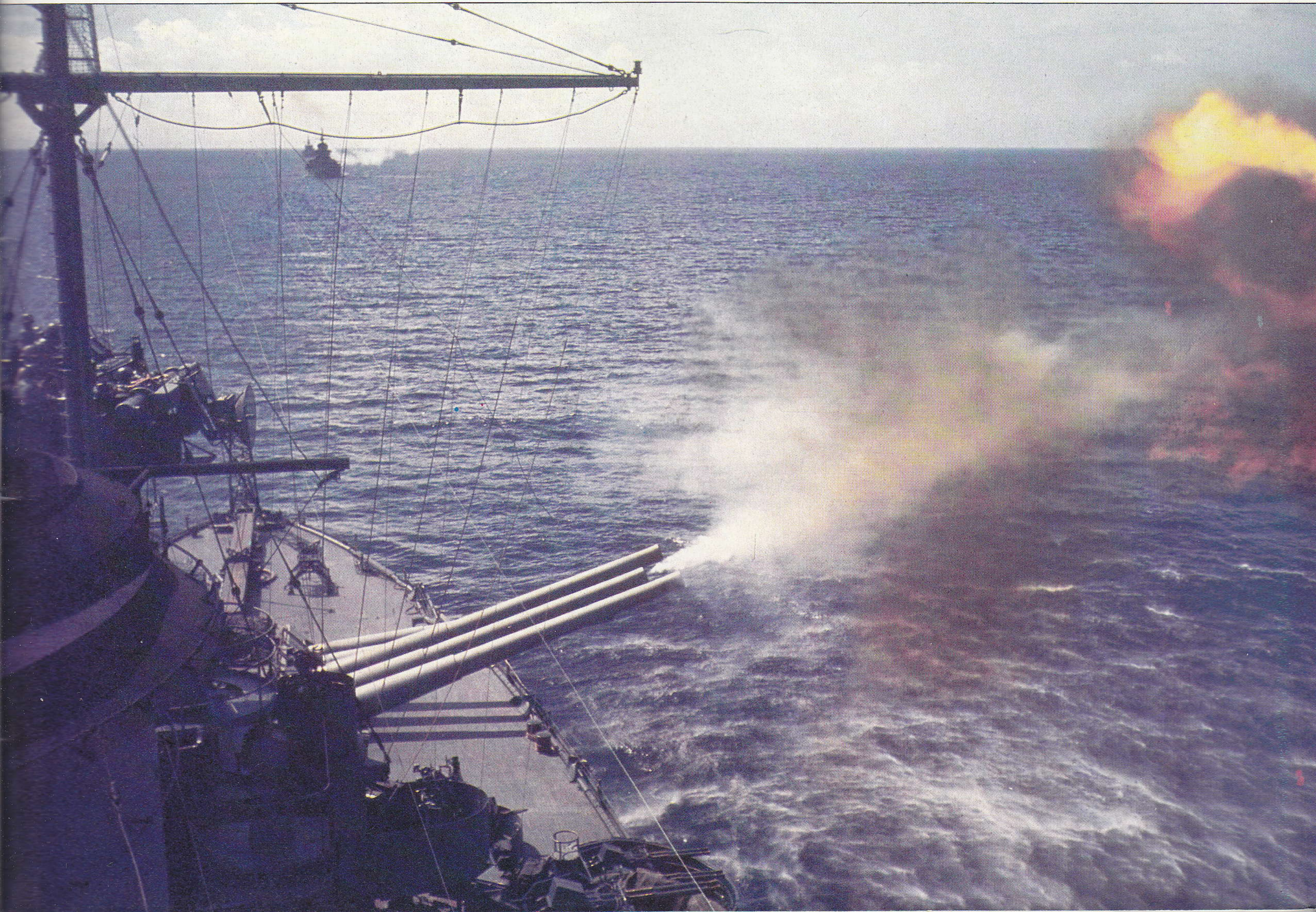
When World War II broke out in September 1939 it was widely assumed that the battleship was still the most powerful warship, but by 1945 its place had been taken by the aircraft-carrier. Air power proved capable of overwhelming defensive gunpower, and the air attack on Pearl Harbor, coupled with the loss of the British *Prince of Wales* and the *Repulse* to air attack, signalled the end.

In fact the battleship continued to play a useful role right up to the end. Battleships were an integral part of the fast carrier task forces, providing not only defensive anti-aircraft fire but also invaluable gunfire in support of amphibious landings. Thus it was not so much that battleships had become useless but rather that the bombs and torpedoes of carrier strike aircraft could do more damage at a much greater distance. The vulnerability of the carrier was just as great, but its offensive potential made the aircraft-carrier worth defending.

In the early years of the war, when shore-based aircraft were often not available, battleships' guns were the only way of stopping enemy heavy ships. In May 1941 the *Bismarck* could only be stopped by other battleships, even if carrier aircraft played a vital role in slowing her down. Similarly the US Navy's old battleships at Surigao Strait in October 1944 were the only sure way of stopping the Japanese battleships: destroyers and motor torpedo boats did their best but did not have the stopping power.

As the full danger of air attack was appreciated, all battleships received extra anti-aircraft batteries, but the only way to guarantee immunity was to provide air cover. Six battleships were sunk by air attack (bombs and torpedoes), and only two by submarine torpedoes at sea. Another 12 ships were sunk in harbour, either by high-level bombing or by special assault units.

The triple 356-mm (14-in) guns of USS New Mexico *fire at Japanese defences on Saipan during the Marianas campaign in June 1944. Pre-assault bombardment had become one of the main roles of the battleship.*



UK

HMS *Renown*

The battle-cruiser HMS ***Renown*** was a veteran of World War I but, unlike her sister *Repulse*, underwent full modernization. She emerged from Portsmouth Dockyard on 2 September 1939, just in time for the outbreak of war.

During her three-year refit she had been almost totally rebuilt, with new machinery and boilers (saving 2,800 tons of weight), new superstructure and bridgework, and additional armour. The three gun turrets were taken out and modified to give the 381-mm (15-in) guns 30° elevation, and an entirely new anti-aircraft armament was provided: 10 twin 114-mm (4.5-in) gun mountings, three 8-barrelled pom-poms and four quadruple 12.7-mm (0.5-in) machine-guns. The weight saved on machinery was used to strengthen deck armour, particularly by adding 102-mm (4-in) armour over the magazines and 51-mm (2-in) armour over the machinery. She was also given a cross-deck catapult and a large hangar capable of accommodating two Walrus amphibian aircraft.

The new role for the ship was to act as a fast escort for aircraft-carriers, and when the *Renown* joined the Home Fleet she was teamed with the new carrier HMS *Ark Royal* in a partnerhip which continued for a long time. After hunting for KMS *Graf Spee* in the South Atlantic in November 1939 she returned to the Home Fleet as flagship of Vice Admiral Whitworth, and took part in the Norwegian campaign.

Early on the morning of 9 April 1940 the *Renown* was steaming about 130 km (80 miles) west of the Lofoten Islands in company with nine destroyers when she sighted the German battle-cruisers KMS *Scharnhorst* and KMS *Gneisenau*. The British ship had the advantage of the light and at 04.17 scored a hit on *Gneisenau*'s main fire-control position. The German ships turned away and escaped under cover of snow squalls, but not before the *Renown* had scored two more hits. She was hit by two or three 280-mm (11-in) shells but suffered only slight damage.

In August the *Renown* went to Gibraltar as part of Force 'H' with the *Ark Royal*, but returned to home waters in October 1941. After covering the North African landings she took Winston Churchill to Canada and was then sent to the Eastern Fleet, which was operating in the East Indies. On her return in March 1945 the *Renown* was laid up in reserve, and was sold for scrapping in 1948. Her career had spanned over 30 years, and she had served in every major theatre of the naval war.

Specification

HMS *Renown*

Displacement: 30,750 tons standard, 36,080 tons full load

Dimensions: length 242.0 m (794 ft) overall; beam 27.4 m (90 ft); draught 14.4 m (30 ft 6 in)

Machinery: 4-shaft geared steam turbines delivering 108,000 shp (80536 kW)

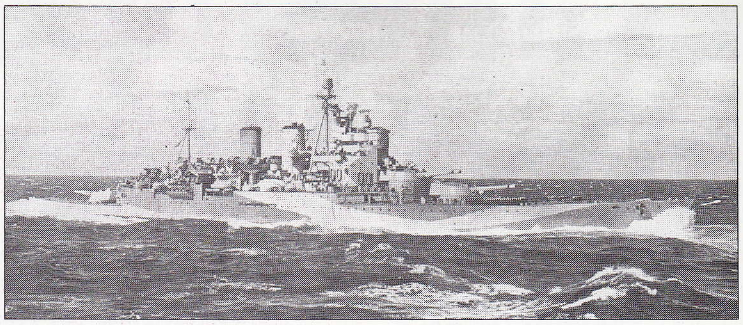
Speed: 29½ kts

Armour: belt 229 mm (9 in); decks 51-102 mm (2-4 in); turrets and barbettes 178-229 mm (7-9 in)

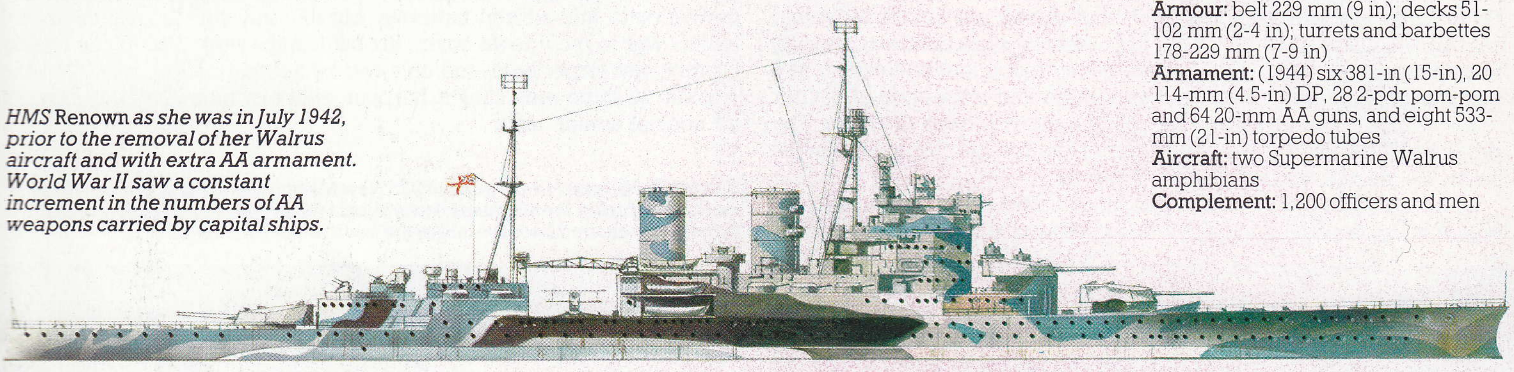
Armament: (1944) six 381-in (15-in), 20 114-mm (4.5-in) DP, 28 2-pdr pom-pom and 64 20-mm AA guns, and eight 533-mm (21-in) torpedo tubes

Aircraft: two Supermarine Walrus amphibians

Complement: 1,200 officers and men



The old battle cruiser HMS* Renown *was completely rebuilt for service in World War II as a fast carrier escort. She served in the Atlantic, Mediterranean and Far East.



HMS* Renown *as she was in July 1942, prior to the removal of her Walrus aircraft and with extra AA armament. World War II saw a constant increment in the numbers of AA weapons carried by capital ships.

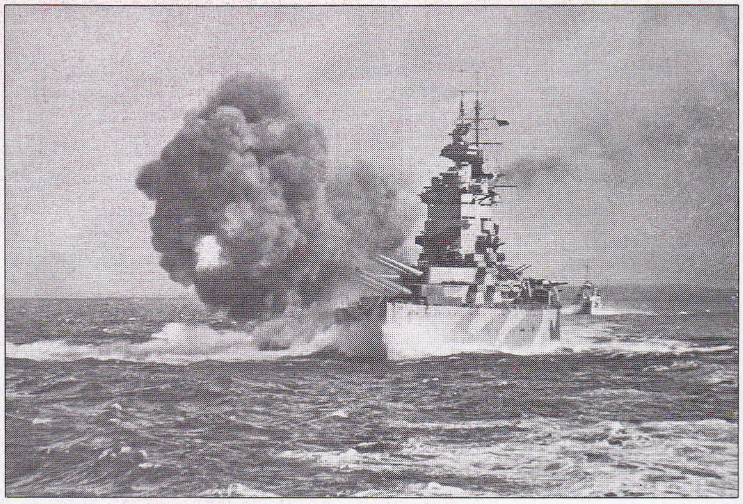
UK

HMS *Nelson*

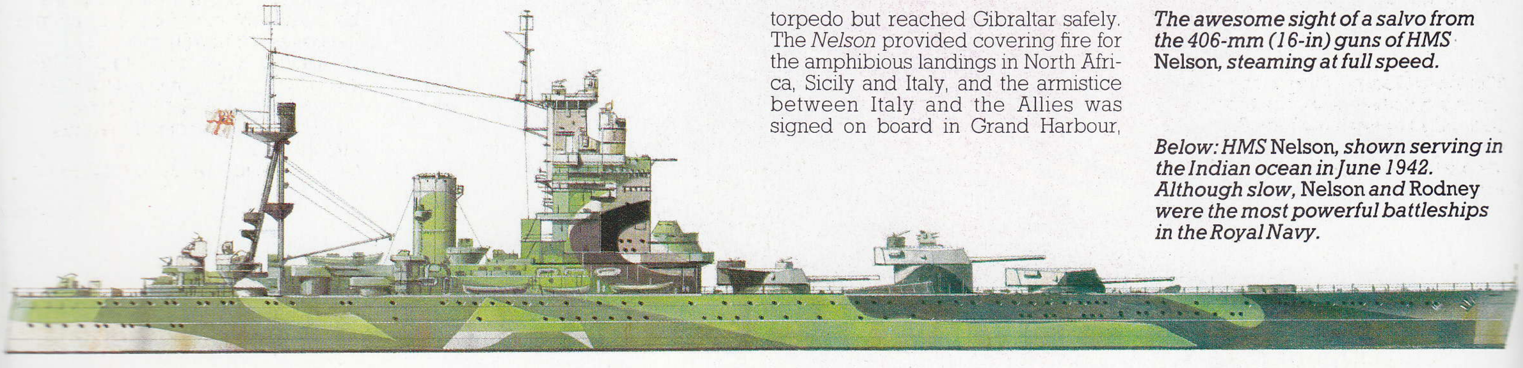
At the outbreak of the war HMS ***Nelson*** and her sister HMS *Rodney* were the most modern British battleships in service. They had been completed in 1927, and were the only capital ships allowed to be built for the Royal Navy under the Washington Treaty. As such they were severely constrained by the need to keep within a standard displacement of 35,000 tons while at the same time carrying 406-mm (16-in) guns and heavy protection.

The designers adopted many unusual expedients to meet the specifications, including an 'all-or-nothing' scheme of armouring and the concentration of all three 406-mm (16-in) turrets forward of the bridge, and all 152-mm (6-in) guns aft. Another important innovation, not revealed until long after World War II, was the provision of 'water protection' or liquid-loaded vertical bulkheads below the waterline. With an additional 2,800 tons of water held in these compartments, any torpedo explosion would dissipate its effect over a large area of the bulkhead. Although the standard displacement of the two ships averaged 1,300 tons below the treaty limit, this was achieved by not flooding the vertical compartments in peacetime.

The *Nelson* was very badly damaged by a magnetic mine while entering Loch Ewe in December 1939, and was under repair until August 1940. In September 1941 she left the Home Fleet to join Force 'H' for a Malta convoy operation. On 27 September she was hit forward by an Italian aircraft torpedo but reached Gibraltar safely. The *Nelson* provided covering fire for the amphibious landings in North Africa, Sicily and Italy, and the armistice between Italy and the Allies was signed on board in Grand Harbour,



The awesome sight of a salvo from the 406-mm (16-in) guns of HMS* Nelson, *steaming at full speed.

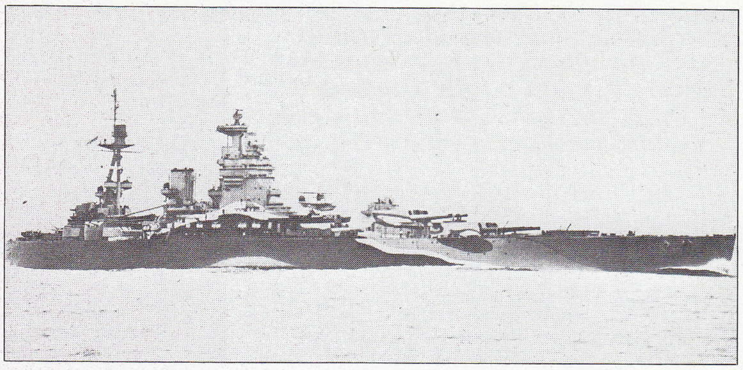


Below: HMS* Nelson, *shown serving in the Indian ocean in June 1942. Although slow,* Nelson *and* Rodney *were the most powerful battleships in the Royal Navy.

Malta, on 29 September 1943.

The ship sailed to the United States for an overhaul in September 1944, and five months later she sailed for the East Indies as flagship of the Eastern Fleet. On her return at the end of 1945 she replaced her sister *Rodney* as flagship of the Home Fleet at Scapa Flow. Having been recently modernized she remained in commission and in 1946 joined the Training Squadron at Portland for two years. With her sister she was laid up in the Firth of Forth in 1948 and used as a target for aerial bombing before being scrapped. She and her sister were greatly under-rated, and in 1939 they were certainly among the most powerful battleships afloat, with many more advanced features than contemporary designs in other navies.

Specification
HMS *Nelson*
Displacement: 33,313 tons standard, 38,400 tons full load
Dimensions: length 216.4 m (710 ft) overall; beam 32.3 m (106 ft); draught 8.5 m (28 ft)
Machinery: 2-shaft geared steam turbines of 45,000 shp (33556 kW)
Speed: 23 kts
Armour: belt 330-356 mm (13-14 in); decks 95-159 mm (3.75-6.25 in); turrets and barbettes 381-406 mm (15-16 in)
Armament: nine 406-mm (16-in), 12 152-mm (6-in), six 120-mm (4.7-in) AA, 16 2-pdr pom-pom and eight 12.7-mm (0.5 in) AA guns, and two 622-mm (24.5-in) torpedo tubes
Aircraft: none
Complement: 1,314 officers and men



HMS Rodney *and her sister ship* Nelson *were unusual in having all three 406-mm (16-in) turrets grouped forward.*

UK

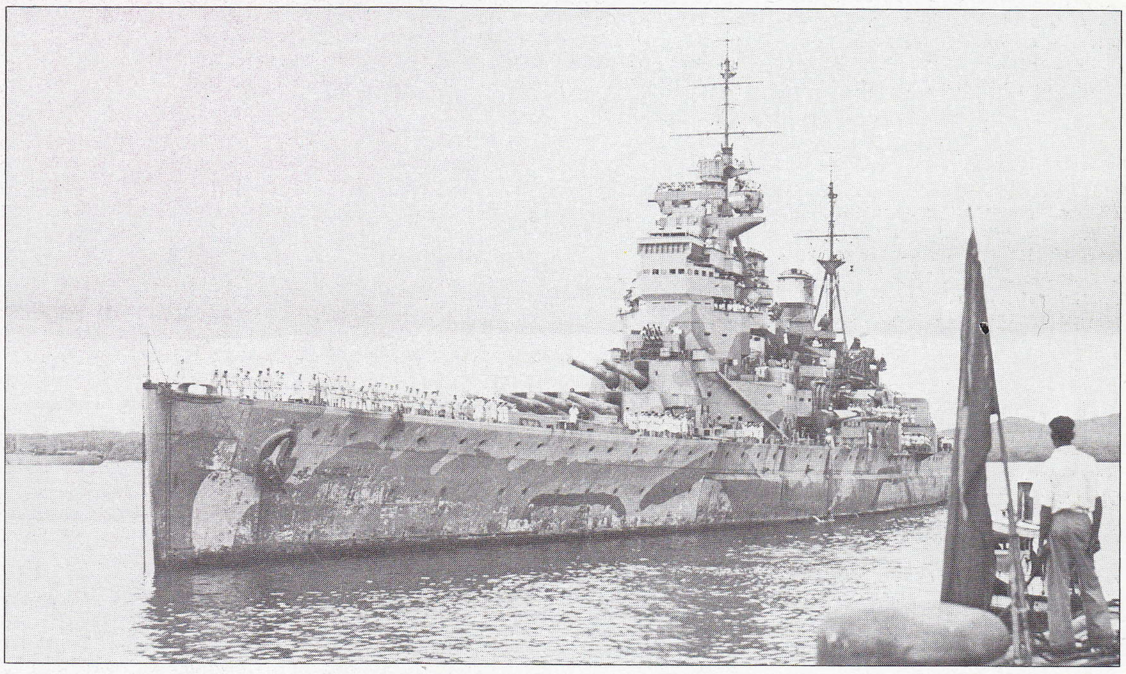
HMS *Prince of Wales*

The second ship of the 'King George V' class, HMS **Prince of Wales** was laid down in January 1937, launched in May 1939 and completed at the end of March 1941. She was still working up to operational efficiency on 23 May when she was ordered to leave Scapa Flow, with the flagship HMS *Hood*, to engage the German battleship KMS *Bismarck*.

The *Prince of Wales* was still suffering from teething troubles: one of her 356-mm (14-in) turrets could only fire one shell, the turrets were all subject to minor breakdowns, and the new Type 284 gunnery radar was not working. To make matters worse the inexperienced crew of 'Y' quadruple 356-mm (14-in) turret made an error in loading drill which jammed the turret. When the flagship *Hood* blew up, the *Prince of Wales* was thus badly placed to withstand the fire of two undamaged German ships. In spite of this she acquitted herself well. The Type 281 air-warning set was used to provide ranges to the guns, enabling her to get 'straddles' on the *Bismarck* resulting in two or three underwater hits. One of these hits caused serious contamination of the oil fuel and another reduced the *Bismarck*'s speed by 2 kts, so it can be fairly said that the *Prince of Wales* initiated the chain of events which brought the *Bismarck* to her doom.

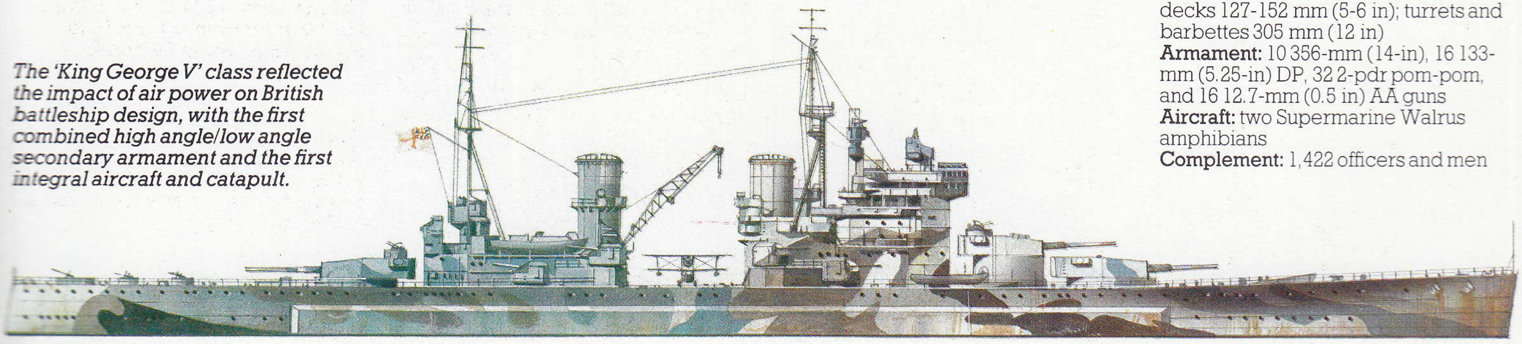
Although hit seven times the *Prince of Wales* suffered comparatively little damage as only three of the shells detonated. The most serious damage was caused by a ricochet on the compass platform, which killed or wounded all but the captain.

In August 1941 the 'PoW' carried Winston Churchill across the Atlantic to the Atlantic Charter meeting with President Roosevelt in Newfoundland. She hoisted the flag of Sir Tom Phillips, C-in-C Eastern Fleet in October, and left for Singapore on 25 October, in company with HMS *Repulse*. Force 'Z', as the two ships were designated, arrived at Singapore on 2 December, but eight days later they were sunk by Japanese torpedo-bombers. The *Prince of Wales* was crippled by a single torpedo which struck the port side abreast of the aftermost 133-mm (5.25-in) gun turret. The port outer propeller shaft was badly distorted, and because it was not rapidly disconnected it continued to revolve, making an enormous hole in the after bulkheads. Then the shock-effect of near-misses from bombs put five of the eight dynamos out of action, robbing the ship of pumping and power for the anti-aircraft guns. Out of control, she was unable to avoid another four torpedoes. She finally sank an hour and twenty minutes after the first attack, with the loss of Admiral Phillips and Captain Leach.



The doomed Prince of Wales *arriving at Singapore on 2 December 1941. She would be sunk only eight days later by Japanese aircraft off the coast of Malaya.*

Specification
HMS *Prince of Wales*
Displacement: 38,000 tons standard, 43,350 tons full load
Dimensions: length 227.0 m (745 ft); beam 31.4 m (103 ft); draught 8.5 m (28 ft) mean
Machinery: 4-shaft geared steam turbines delivering 110,000 shp (82027 kW)
Speed: 28 kts
Armour: belt 356-281 mm (14-15 in); decks 127-152 mm (5-6 in); turrets and barbettes 305 mm (12 in)
Armament: 10 356-mm (14-in), 16 133-mm (5.25-in) DP, 32 2-pdr pom-pom, and 16 12.7-mm (0.5 in) AA guns
Aircraft: two Supermarine Walrus amphibians
Complement: 1,422 officers and men



The 'King George V' class reflected the impact of air power on British battleship design, with the first combined high angle/low angle secondary armament and the first integral aircraft and catapult.

Warspite in Action

HMS Warspite *had been in service for nearly a quarter of a century when she went to war again in 1939. A veteran of the Battle of Jutland, she went on to even greater achievement in World War II.*

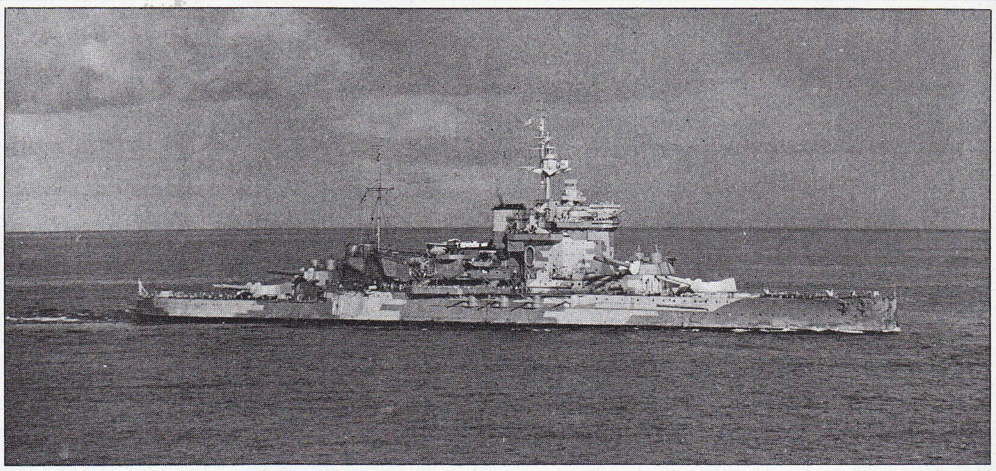
In the pre-dawn darkness of a northern spring morning, an anonymous group of warships steered north east up the Vestfjord in northern Norway. They showed no lights, but could be dimly made out as a group of fleet destroyers surrounding the looming bulk of a battleship. The ships were British, their objective Narvik. It was 13 April 1940 and HMS *Warspite* was on her way to her second shooting war.

Many ships have led eventful careers, but *Warspite* had a more eventful career than most. She seemed, inevitably, to be where the trouble was, yet she always came through, gaining a firm reputation as a 'lucky' ship. Completed in 1915, she survived not only 13 heavy-calibre hits at Jutland but also her first enemy obituary. She survived also two severe collisions with her sisters.

When 20 years old she was given a half-life modernization which was exceptionally thorough. A virtual rebuild saw her acquire improved protection, uprated machinery and modifications to her main battery to improve its range. It was £3 million well spent.

Mediterranean-based, the *Warspite* had been summoned back at the outbreak of World War II and had temporarily reinforced the Home Fleet. In April 1940, the 'phoney' war had erupted with the German invasion of Norway. For a land power, the Germans had devised a plan that was imaginative and bold, using groups of the not over-large Kriegsmarine to penetrate directly to half a dozen key ports, carrying troops for their occupation. The most northerly move was against the important ore-transshipment port of Narvik, the force consisting of 10 large destroyers carrying 2,000 troops. Like the remainder, this force was successful in its primary task.

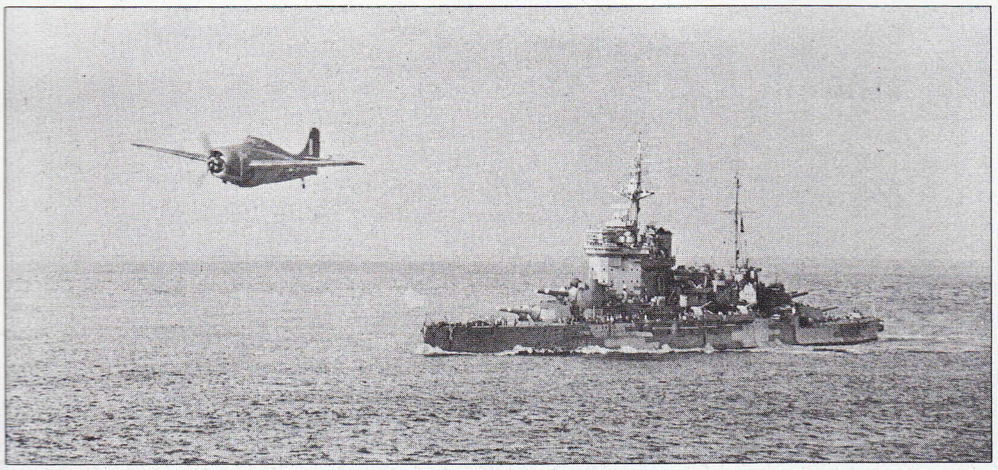
Within 24 hours, before the enemy was really established, a small force of British destroyers under Captain Warburton-Lee penetrated to the anchorage and, although heavily outnumbered, sank two of the enemy warships and half a dozen merchantmen for the loss of two of their own. This action was fought on 10 April 1940 and became known as the 1st Battle of Narvik. It was to complete the enemy's destruction and to open the way for Narvik's recapture that *Warspite* and her pack were hurrying to a second battle.



HMS* Warspite *was flagship of the Mediterranean Fleet in 1940, and served in nearly every theatre of the war. In spite of being a veteran of the previous war her modernization in the 1930s made her a powerful unit of the battle fleet.

Toward the end of the forenoon the force left the broad waters of the Vestfjord for the more constricted passage along the Ofotfjord. It was a great gamble on the part of the Admiralty to send a capital ship into such constricted waters without air superiority but, following Admiral Beatty's example at the Heligoland Bight, they considered that the possible reward justified the risk.

Even as it turned eastward, with the bulk of the battleship tucked in behind the arrowhead destroyer formation, the force was unsuccessfully attacked by a German submarine, but hurried on with the grim confirmation that its presence was known. Deep inlets penetrated on each side of the fjord, whose steep-to sides merged ahead imperceptibly into the haze. Well aware of the enemy's opportunities to ambush the force with a salvo of torpedoes, Vice Admiral Whitworth, whose flag *Warspite* wore, ordered the Supermarine Walrus amphibian to be launched to reconnoitre ahead of the force. This discovered a destroyer (which was overwhelmed by a British division) and, having reported on the situation at Narvik, discovered a U-boat on the surface, which it promptly sank.



A Grumman Martlet carrier fighter aircraft seen over the* Warspite*. The 'Old Lady' was held in great affection and was regarded as a lucky ship.

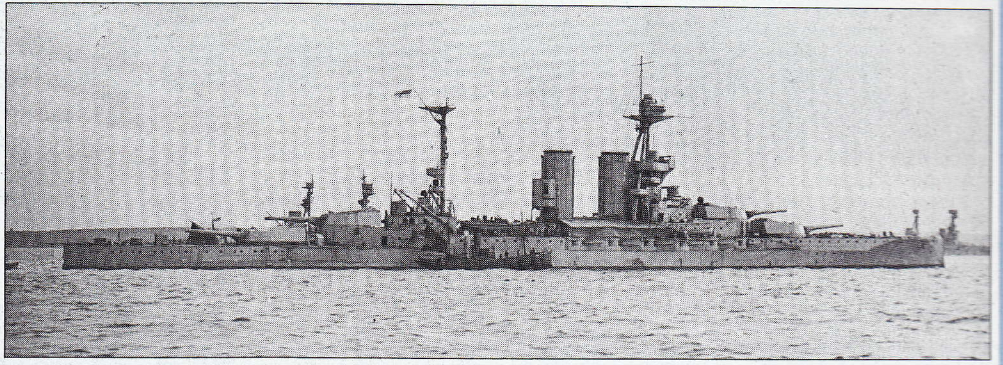
With no avenue of escape available, the German commander weighed and proceeded in open order to meet the British. *Warspite*, battle ensigns streaming, opened up with her forward turrets. The crash of the two- and four-gun salvoes of 381-mm (15-in) gunfire reverberated from the brooding cliffs, the range so short that the echoes of their detonations arrived before the noise ceased. In what was virtually a 'general chase', a chaotic destroyer action developed against a backdrop of the steeple-high splashes of the heavy-calibre shells. As the fjord filled with smoke from guns, funnels and, increasingly, fires, the German destroyers were beaten back up the waterway. Two were sunk on the south side of the fjord opposite the now-marooned garrison and one more on the north side of the fjord, and the remainder were forced into the narrow dead end of the Rombaksfjord. With *Warspite* firmly corking the entrance, her destroyers went in like terriers; their reward was wrecked and gutted hulks of the last four German destroyers. It was annihilation on a scale which Nelson would have approved.

Little more than a month later, *Warspite* was back in the Mediterranean as flagship of the commander-in-chief Admiral Cunningham. At the opening skirmish with the Italians, off Calabria on 9 July 1940, *Warspite* hit the enemy flagship *Giulio Cesare* at 23775 m (26,000 yards). Using their superior speed, the Italians broke off the action.

This moral ascendancy was rammed home in the following March, when the Italians, under considerable German pressure, attempted to intercept a British convoy south of Crete. Aircraft sighted three separate groups of enemy ships in the area, one including the new 31-kt battleship *Vittorio Veneto*, and Cunningham left Alexandria with all despatch. A British cruiser force engaged the Italians but was so badly outgunned that Cunningham, still 145 km (90 miles) distant, reluctantly ordered an air strike from the carrier *Formidable*. Though this relieved the pressure on the cruisers, it had the inevitable effect of making the enemy turn westward for home.

All day RAF and FAA forces kept up the attempt to damage a major Italian unit, so slowing the force sufficiently for the elderly British battleships (*Warspite* was accompanied by her sisters *Valiant* and *Barham*) to catch up. Mid-afternoon saw the Italian battleship torpedoed once; the immediate effect was almost to stop her, but she was back to 19 kts after a few precious hours. At dusk, a heavy cruiser was also hit and Cunningham ploughed into the darkness with a light screen thrown out ahead, ready to take the chance of likely chaos in a night melée.

Shortly after 21.00, a cruiser reported an unidentified ship lying stopped in the darkness. Within the hour, the radar-equipped *Valiant* confirmed the contact, giving her length as 'over 600 ft'. Was it the *Veneto*? At 20.20 the range had dropped to 7300 m (8,000 yds), and the three battleships, their escort standing clear, turned to bring their broadsides to bear. With the range down to below 3660 m (4,000 yards), the target suddenly became visible in the blackness of the overcast night, not one ship but three, two cruisers and a destroyer. Searchlights snapped on and the guns opened up simultaneously. For a couple of brief seconds the targets, all unsuspecting, lay silver in the beams. Each then erupted as complete 381-mm (15-in) salvoes slammed home; at so short a range, missing was impossible, devastation immediate and absolute. The light forces accounted for a third cruiser and destroyer. All had held back to support their torpedoed colleague. Though the *Veneto* had made good her escape, the night's haul had been more than satisfactory. What came to be called the Battle of Matapan confirmed the Royal Navy's mastery of the Mediterranean, even though it was to be severely challenged in days to come, when *Warspite* herself was heavily damaged by bombing during the evacuation of Crete. Repaired in the USA, she was present at the Salerno landings, only to receive a grievous hit from a glider bomb. Pierced through, she was still only temporarily patched when called upon for shore bombardment duty at the Normandy landings. She was mined soon afterwards. By now her battered hull was not worth full repair and she was assisted to her last bombardments at Brest, Le Havre and Walcheren. She survived the war, terribly scarred, and scored her final victory by running aground and being wrecked on the way to the breakers. In Cunningham's own words: 'No ship had a worthier fighting record'.



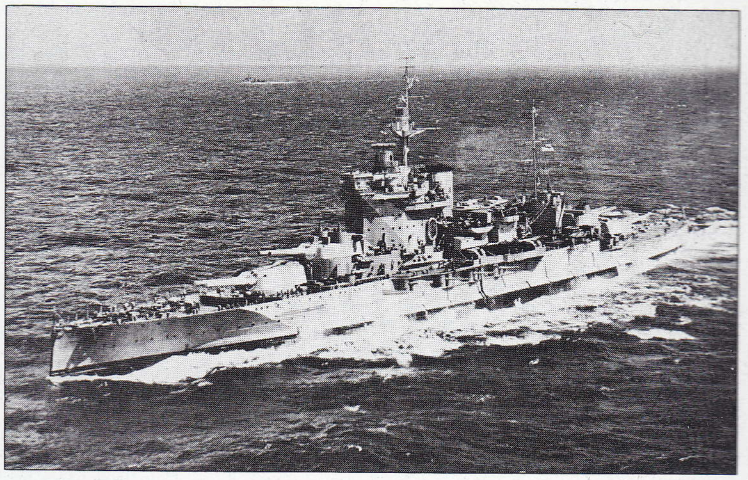
The* Warspite *at Scapa Flow in 1917 shows how greatly her appearance was changed by modernization. A large tower bridge and a hangar were added, while the twin funnels were replaced by a single one.

UK

HMS *Warspite*

Like so many battleships which distinguished themselves in World War II, HMS **Warspite** was a veteran of the previous conflict. The fourth unit of the 'Queen Elizabeth' class, she was laid down in October 1912, launched in November 1913 and completed in March 1915. She served for most of World War I with the Grand Fleet, but at the Battle of Jutland in May 1916 her squadron was attached to Vice Admiral Beatty's battle-cruisers. When her steering gear broke down she turned circles and came under fire from seven German battleships, but escaped without serious damage.

In the early 1920s the *Warspite* was modernized, with anti-torpedo bulges, more anti-aircraft guns and the forward funnel trunked backwards into the seond one. In 1934 she was taken in hand for a much more comprehensive reconstruction which was to be the prototype for all British capital ships. New steam turbines and new boilers were provided, with six modern boilers replacing 24 old boilers; this reduced their total weight from 3,690 tons to 2,300 tons. Subdivision was improved, more deck armour was added, and the elevation of the 381-mm (15-in) guns was increased from 20° to 30°, so increasing range from 21395 m (23,400 yards) to 29445 m (32,200 yards). The appearance of the ship was also totally transformed, with a single funnel and a massive tower superstructure enclosing all control positions.

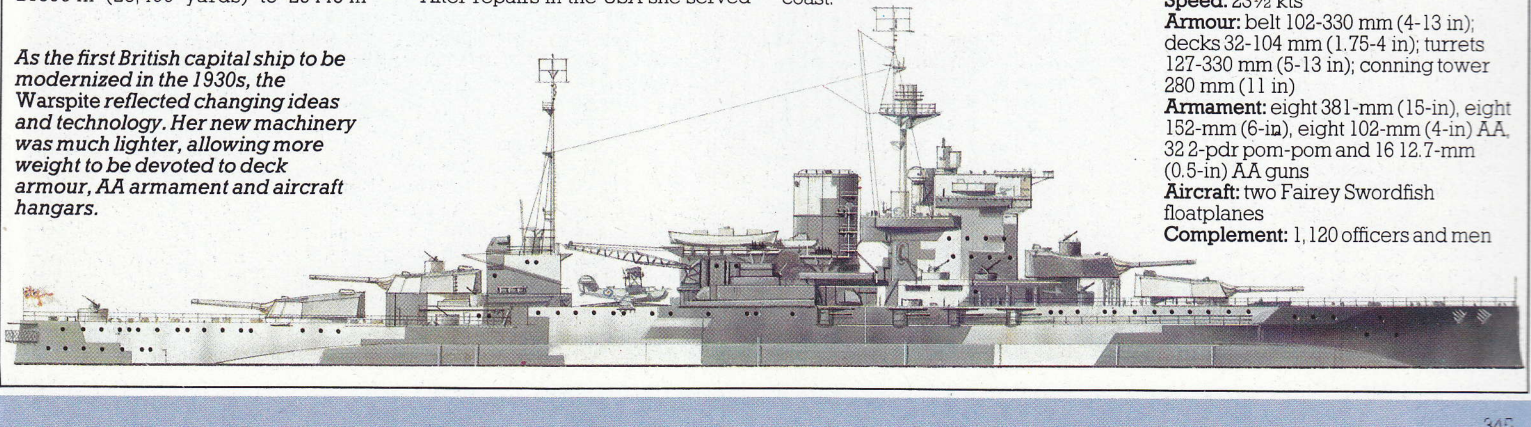


The* Warspite *at sea in 1943, showing her port side battery of 152-mm (6-in) and 102-mm (4-in) guns. Her quadruple machine-guns have been replaced by 20-mm Oerlikon guns, and she has a full outfit of air warning and gunnery radars.

The *Warspite* added 13 battle honours to the one she had earned in 1916. In April 1940 her main armament helped to sink the German destroyers at Narvik. Then she became Admiral Cunningham's flagship in the Mediterranean Fleet, and was immediately in the forefront of the naval war. During the Battle of Calabria in July 1940 she hit the Italian battleship *Giulio Cesare* with her first salvo at 23775 m (26,000 yards), the greatest distance at which one ship ever hit another on the move. With HMS *Barham* and HMS *Valiant* she sank three Italian heavy cruisers in the Battle of Matapan in March 1941, but two months later was badly damaged by air attack during the evacuation from Crete.

After repairs in the USA she served for a while in the Eastern Fleet in 1942, but returned to the Mediterranean in 1943. She was nearly sunk by glider bombs off Salerno in September 1943, but was repaired in time for the Normandy landings in June 1944. Despite mine damage she carried out a large number of bombardments until laid up in January 1945. She was sold for scrap in 1946, but ran aground on the Cornish coast.

Specification
HMS *Warspite*
Displacement: 31,372 tons standard, 36,450 tons full load
Dimensions: length 195.0 m (640 ft) overall; beam 31.7 m (104 ft) over bulges; draught 9.37 m (30 ft 9 in)
Machinery: 4-shaft geared steam turbines delivering 80,000 shp (59656 kW)
Speed: 23½ kts
Armour: belt 102-330 mm (4-13 in); decks 32-104 mm (1.75-4 in); turrets 127-330 mm (5-13 in); conning tower 280 mm (11 in)
Armament: eight 381-mm (15-in), eight 152-mm (6-in), eight 102-mm (4-in) AA, 32 2-pdr pom-pom and 16 12.7-mm (0.5-in) AA guns
Aircraft: two Fairey Swordfish floatplanes
Complement: 1,120 officers and men



As the first British capital ship to be modernized in the 1930s, the* Warspite *reflected changing ideas and technology. Her new machinery was much lighter, allowing more weight to be devoted to deck armour, AA armament and aircraft hangars.

GERMANY

KMS *Scharnhorst*

KMS **Scharnhorst** was planned as the *Ersatz Elsass*, fourth of a class of six planned 'pocket battleships'. By 1933, however, the weaknesses of the 'pocket battleship' or *Panzerschiffe* were so obvious that Hitler gave the German navy permission to expand the design to 26,000 tons as a reply to the French *Dunkerque*.

It was hoped to arm the ship with three twin 380-mm (15-in) turrets, but to save time three triple 280-mm (11-in) turrets were used. The design was nominally of 26,000 tons, but had reached 32,000 tons; to conceal the size of the new battle-cruiser the Kriegsmarine continued to quote the lower figure.

For most of her active life the *Scharnhorst* operated with her sister KMS *Gneisenau*, and both ships made forays into the North Atlantic in 1940-1. The *Scharnhorst* was badly damaged by a torpedo fired by the destroyer HMS *Acasta* while attacking the carrier HMS *Glorious* in June 1940.

Although the two ships posed a considerable threat to the British while lying at Brest in 1941 and the repeated raids by the Royal Air Force were far too inaccurate to do any serious damage, Hitler felt the two units were too exposed, and ordered them to return. Operation 'Cerberus', the daylight dash through the English Channel in February 1942, was probably the Kriegsmarine's greatest success, for it took the British completely by surprise, the two battle-cruisers and the heavy cruiser *Prinze Eugen* slipping past ineffectual air and sea attacks. Apart from slight damage to *Scharnorst* from a magnetic mine during the final phase it had been a humiliation for the British and proof that audacity pays.

After repairs lasting until August 1942 the ship was sent to Norway in March 1943. She took part in the raid on Spitzbergen in September but otherwise lay in a remote fjord until December 1943, when Admiral Dönitz ordered her to sea for an attack on a British convoy.

It was a badly planned operation, and the *Scharnhorst* failed in her attempt to brush aside the destroyers and cruisers escorting the convoy. Incompetent reconnaissance by the Luftwaffe left her with no idea that the battleship HMS *Duke of York* was closing fast, and she was taken by surprise when 356-mm (14-in) shells started to hit her. She disengaged but the British and Norwegian destroyers slowed her down with torpedoes, allowing the *Duke of York* to pound her again. She was finally sunk by torpedoes from HMS *Sheffield* and HMS *Jamaica* and went down with the loss of all but 46 of 1,840 men on board.

Specification

KMS *Scharnhorst*

Displacement: 32,000 tons standard, 38,900 tons full load

Dimensions: length 234.9 m (770 ft 8 in) overall; beam 30.0 m (98 ft 5 in); draught 9.1 m (29 ft 10 in) deep

Machinery: 3-shaft geared steam turbines delivering 160,000 shp (119312 kW)

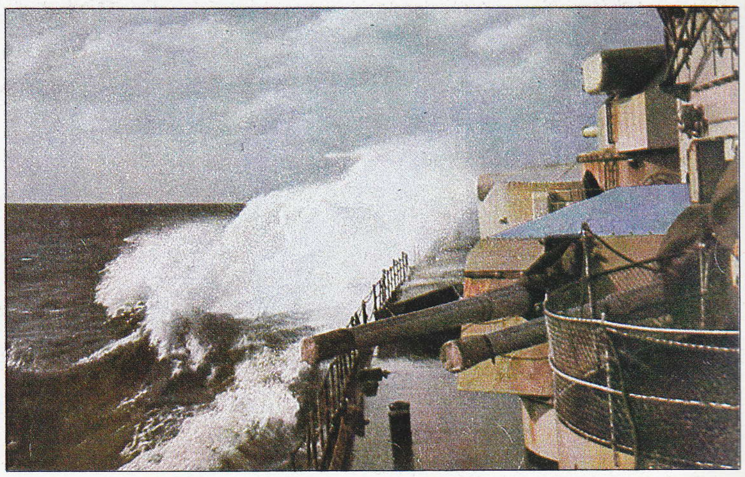
Speed: 32 kts

Armour: belt 330 mm (13 in); decks 50-110 mm (2-4.25 in); turrets 355 mm (14 in)

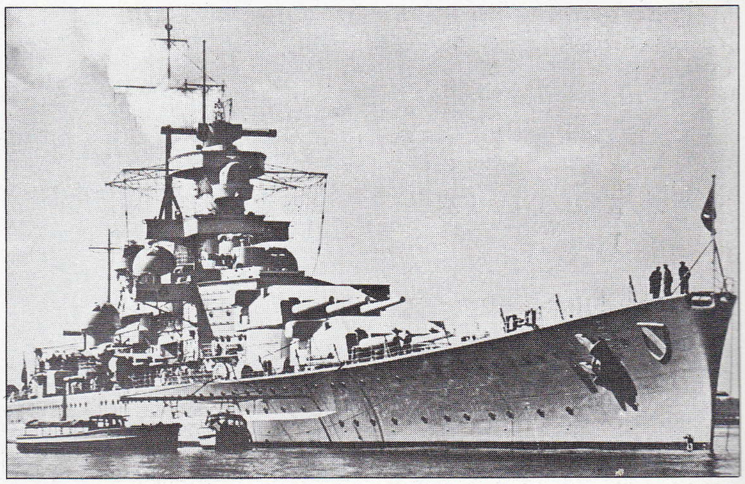
Armament: nine 280-mm (11-in), 12 150-mm (5.9-in), 14 105-mm (4.1-in) AA and 16 37-mm AA guns, and six 533-mm (21-in) torpedo tubes

Aircraft: two Arado floatplanes

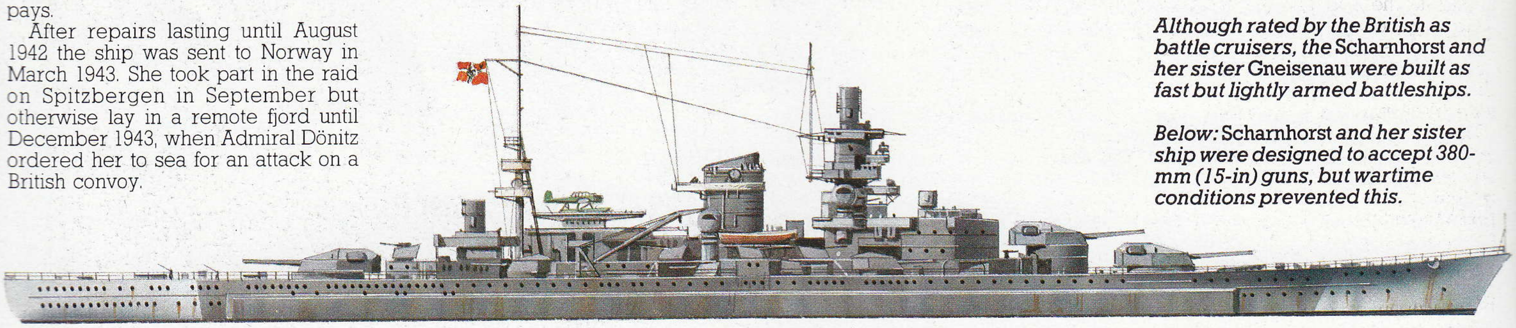
Complement: 1,840 officers and men



Scharnhorst had a more eventful war career than most Kriegsmarine capital ships, yet this scene would have been a rare event for her crew, confined to harbour as she was for so long.



Although rated by the British as battle cruisers, the* Scharnhorst *and her sister* Gneisenau *were built as fast but lightly armed battleships.



Below:* Scharnhorst *and her sister ship were designed to accept 380-mm (15-in) guns, but wartime conditions prevented this.

GERMANY

KMS *Bismarck*

The first full-scale battleships built for Germany's new Kriegsmarine after Hitler abrogated the Versailles Treaty were two 35,000-ton ships. As with the battle-cruisers, the design followed closely the final designs of the previous war, but with considerably higher installed power. The first of this pair was launched and christened KMS ***Bismarck*** on 14 February 1939. She was in fact 6,000 tons heavier than the international treaty limits allowed, but much of the extra tonnage went into additional fuel stowage.

The *Bismarck* was commissioned in August 1940 but underwent a further eight months of training in the Baltic before she was considered ready for a breakout into the Atlantic. In May 1941 she and the heavy cruiser *Prinz Eugen* left the Baltic bound for Bergen, but their passage had been detected by pro-British Swedes and the Admiralty had been alerted by analysis of radio traffic. As a result the heavy cruiser HMS *Suffolk* was already on station in the Denmark Strait on 23 May, and detected the two German ships on radar.

On the next morning the British Battle-Cruiser Squadron tried to intercept the German ships, but the German ships got the range quickly. *Prinz Eugen*'s shells started a fire aboard HMS *Hood*, and shortly afterwards she blew up, while the *Bismarck* hit HMS *Prince of Wales* in the bridge. The British ship was then ordered to break off the action and to retire, leaving the German ships to continue their foray into the Atlantic.

Examination soon showed that a large quantity of fuel had been contaminated by underwater damage, and Admiral Lütjens decided to head for Brest. That night Fairey Swordfish torpedo-bombers from HMS *Victorious* attacked with torpedoes, but the single hit inflicted only minor damage. For a while the *Bismarck* eluded her pursuers, but after unwisely transmitting a long radio signal she was detected on 26 May, and that night more Swordfish from HMS *Ark Royal* hit her with two torpedoes, wrecking her steering gear. Further attacks by destroyers followed, although without success, but the *Bismarck* was doomed, unable to manoeuvre and steaming at only 5 kts. On the next morning HMS *King George V* and HMS *Rodney* came over the northern horizon, opening fire at 08.47. The British fire was deadly, and by 09.20 the *Bismarck* was silenced. During that time she had scored only one 'straddle' on the *Rodney* and hit her with a few splinters. In the final stages the range came down to only 3660 m (4,000 yards), and the *Bismarck* was battered into a waterlogged wreck. She was finally torpedoed by the cruiser HMS *Dorsetshire* and sank at 10.40.

Specification

KMS *Bismarck*

Displacement: 41,676 tons standard, 50,153 tons full load

Dimensions: length 251.0 m (823 ft 6 in) overall; beam 36.0 m (118 ft); draught 9.3 m (30 ft 7 in) mean

Machinery: 3-shaft geared steam turbines delivering 138,000 shp (102907 kW)

Speed: 29 kts

Armour: belt 320 mm (12.6 in); decks 50-120 mm (2-4.7 in); turrets and barbettes 230-355 mm (9-14 in)

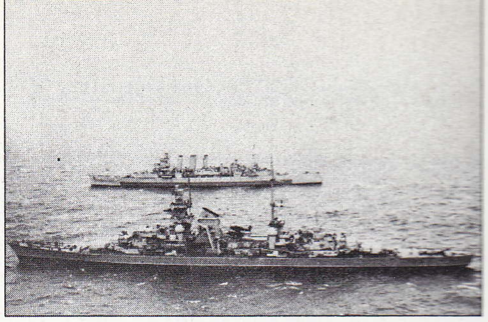
Armament: eight 380-mm (15-in), 12 150-mm (5.9-in), 16 105-mm (4.1-in) AA, 16 37-mm AA and 12 20-mm AA guns

Aircraft: two Arado floatplanes

Complement: 2,192 officers and men

Bismarck in Action

Bismarck *was the most powerful unit in the Kriegsmarine. When she broke out into the Atlantic in May 1941, the threat to Britain's convoy lifeline was such that the Admiralty had to concentrate all available resources to run her to earth.*



The German heavy cruiser Prinz Eugen *steams across the North Sea after the surrender in May 1945, escorted by the British cruiser HMS* Devonshire.

The German battleship KMS *Bismarck* had one of the shortest careers of any warship; from completion to destruction she lasted only nine months, eight of which were spent on training.

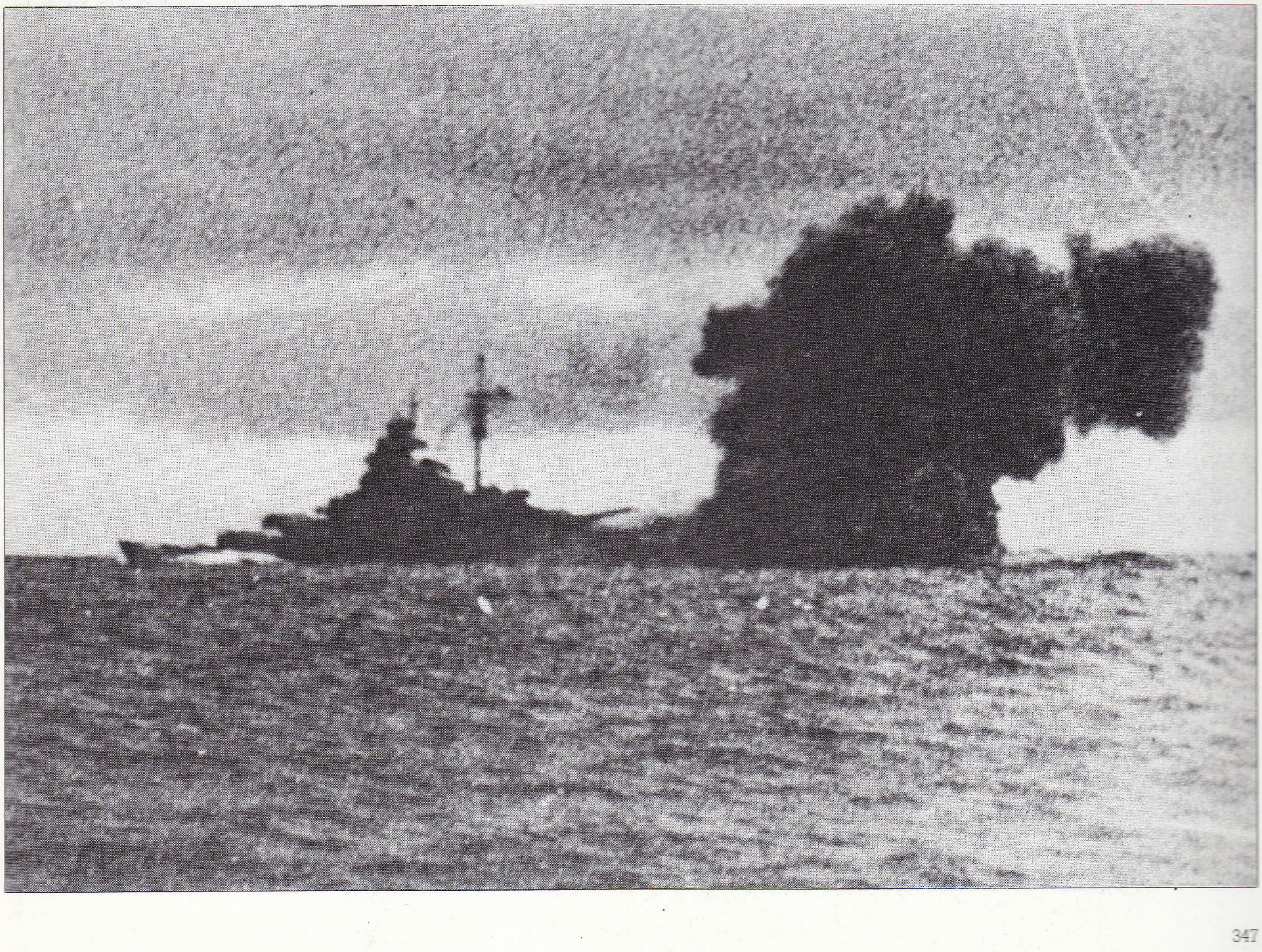
With her consort, the heavy cruiser KMS *Prinz Eugen*, she slipped out of the Baltic on 20 May 1941 bound for Bergen. Their objective was the disruption of the British convoy system in the North Atlantic, for if the British Admiralty could be forced to give up convoying, the U-boats would be able to cut off the flow of shipping from the United States to the UK. The Germans were not to know that the British had detected the break-out, partly through intelligence from Sweden and partly from analysis of radio traffic between Kiel and Bergen. The first sign that Vice Admiral Gunther Lütjens had of British preparedness came late on 23 May, when his force was detected in the Denmark Strait by the heavy cruiser HMS *Suffolk*.

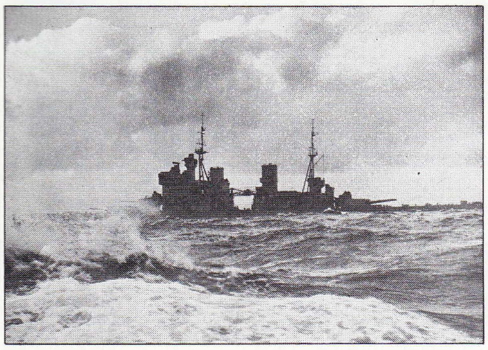
Despite efforts to shake off the *Suffolk*, she and another cruiser, HMS *Norfolk*, kept in touch, with the result that on the morning of 24 May the battle-cruiser HMS *Hood* and the new battleship HMS *Prince of Wales* made contact. At 05.32 the *Hood* opened fire on the *Prinz Eugen* at a range of 24225 m (26,500 yards), the *Prince of Wales* opening fire shortly afterwards. The German ships began to reply at 05.35, but both fired at the leading ship, *Hood*. A 203-mm (8-in) shell from the *Prinz Eugen* started a fire on the *Hood*'s shelter deck, and at about 06.00 the *Bismarck*'s fifth salvo hit. A minute later the *Hood*'s after magazines blew up, destroying the ship with the loss of nearly all hands. Fire now shifted to the *Prince of Wales*, which was hit seven times and suffered one bad hit on the compass platform. But in spite of having everyone on the bridge except the captain killed or wounded, she fought back and hit the *Bismarck* with two or three 356-mm (14-in) shells. She was then ordered to break off the action by the surviving senior officer, the rear admiral commanding the two cruisers, as it was felt that the *Prince of Wales* was not fit for further action.

Admiral Lütjens now had two choices: to return to Bergen to repair the damage to *Bismarck*'s fuel tanks caused by two underwater hits from the *Prince of Wales*, or to continue the North Atlantic sortie. So convinced does he seem to have been that the *Bismarck* was unsinkable that he chose the latter course, despite having lost the element of surprise, despite having lost nearly a third of her fuel, and despite having 2,000 tons of water on board. Later both British and American assessments of the German tactics drew attention to the rashness of the German admiral in trying to conduct a North Atlantic cruise under such conditions.

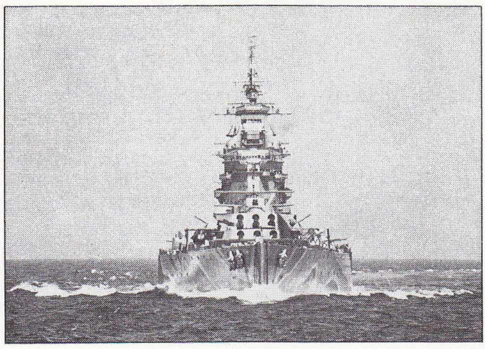
Late that day, with speed dropping to 28 kts and one boiler room out of action, Lütjens realized his mistake, but instead of turning back he headed for Brest. The *Prinz Eugen* was now short of fuel; and she was ordered to proceed independently. The following evening the car-

The Bismarck *fires a salvo from her after turrets at HMS* Prince of Wales *in the Denmark Strait on 24 May 1941.*





HMS King George V *in a rough sea during the first half of 1941, before the removal of her rocket projectors.*



The* Rodney *from dead ahead, showing her Walrus amphibian aircraft stowed on the third 406-mm (16-in) turret. The radar array indicates a date after the battle.

rier HMS *Victorious* flew off a strike of Fairey Swordfish torpedo-bombers. These aircraft were ill-suited to the strike role, but the RAF's refusal to release a squadron of Albacores meant that they were the only torpedo-bombers available to the Home Fleet. Around midnight the nine biplanes found their target, and managed to hit her with one torpedo on the main belt amidships, where the comparatively light warhead could not inflict serious damage. It was nevertheless a remarkable achievement to hit a fast, manoeuvring target at night, in bad weather.

Later on that night the *Bismarck* shook off the *Norfolk* and *Suffolk*, which had been maintaining radar contact at extreme range. And yet, such was the bad luck which dogged the *Bismarck*, that Lütjens apparently assumed that he was still being tracked by radar. He therefore made a long signal back to Germany, providing the British direction-finding stations with the cross-bearing that they needed. RAF Coastal Command was then asked to provide a Consolidated Catalina flying-boat to search in the right sector, with the result that the *Bismarck* was sighted at about 10.30 on 26 May. The sighting came in the nick of time for the Home Fleet had misinterpreted the direction-finding signals and was heading in the wrong direction.

Bismarck found

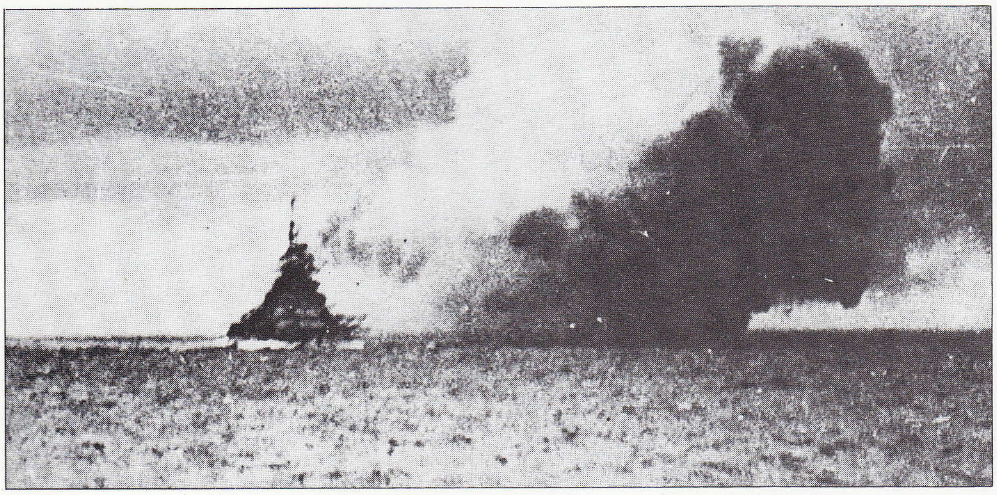
Early on the morning of 26 May a Catalina made the vital sighting, but the gap between the *Bismarck* and her pursuers was now so wide that she could still reach the Brittany coast, and once she came under the protection of shore-based fighter aircraft the British would not dare to bring her to action. The only hope of slowing her down was a torpedo strike from the carrier HMS *Ark Royal*, which was coming up from Gibraltar with the battle-cruiser HMS *Renown* and the cruiser HMS *Sheffield* as escorts. The *Ark Royal* launched a first strike of 15 Swordfish at 14.50 but mistook HMS *Sheffield* for the target.

A tragedy was only averted because the magnetic pistols fitted to the torpedoes malfunctioned when dropped in the very steep seas running; several detonated on hitting the water, and the *Sheffield* was able to dodge the remainder. The incident was turned to advantage when the *Sheffield* signalled the *Ark Royal*, so that for the second strike the Duplex pistols were set back to 'contact'. Around 20.30 the Swordfish found the real *Bismarck*, and this time they knew they had made no mistake when they encountered a hail of Flak. The biplanes flew at an almost suicidal height above the waves, and at times seemed likely to fly into the superstructure, but their bravery was rewarded with two torpedo hits. One hit amidships, causing little damage, but the second struck aft and jammed the rudders.

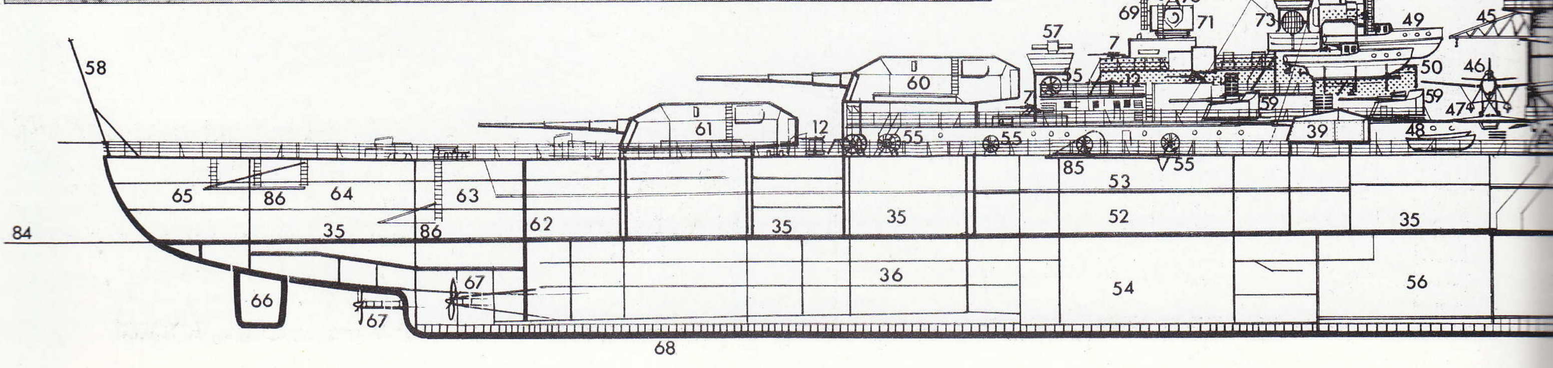
That hit doomed the *Bismarck*, for now she could only steam erratically, using her propellers for steering. She crawled away to the north west, towards the Home Fleet, while her engineers frantically tried to free the rudders and the ship was hauled painfully round onto the proper course. That night a force of British and Polish destroyers made an unsuccessful torpedo attack which further interrupted the work, and everyone aboard the battleship knew that their last battle was now only a few hours away.

On the next morning the Home Fleet battleships, the flagship HMS *King George V* and HMS *Rodney*, appeared on the horizon. At 08.47 *Rodney* fired the first salvo. The *Bismarck* responded, getting a 'straddle' with her second salvo, but the *Rodney*'s 406-in (16-in) shells 'straddled' on the third and fourth, and a hit knocked out *Bismarck*'s forward turret 'Anton'.

Right:* Bismarck *down by the bows as a result of underwater damage from the* Prince of Wales, *seen from the* Prinz Eugen *later the same day.

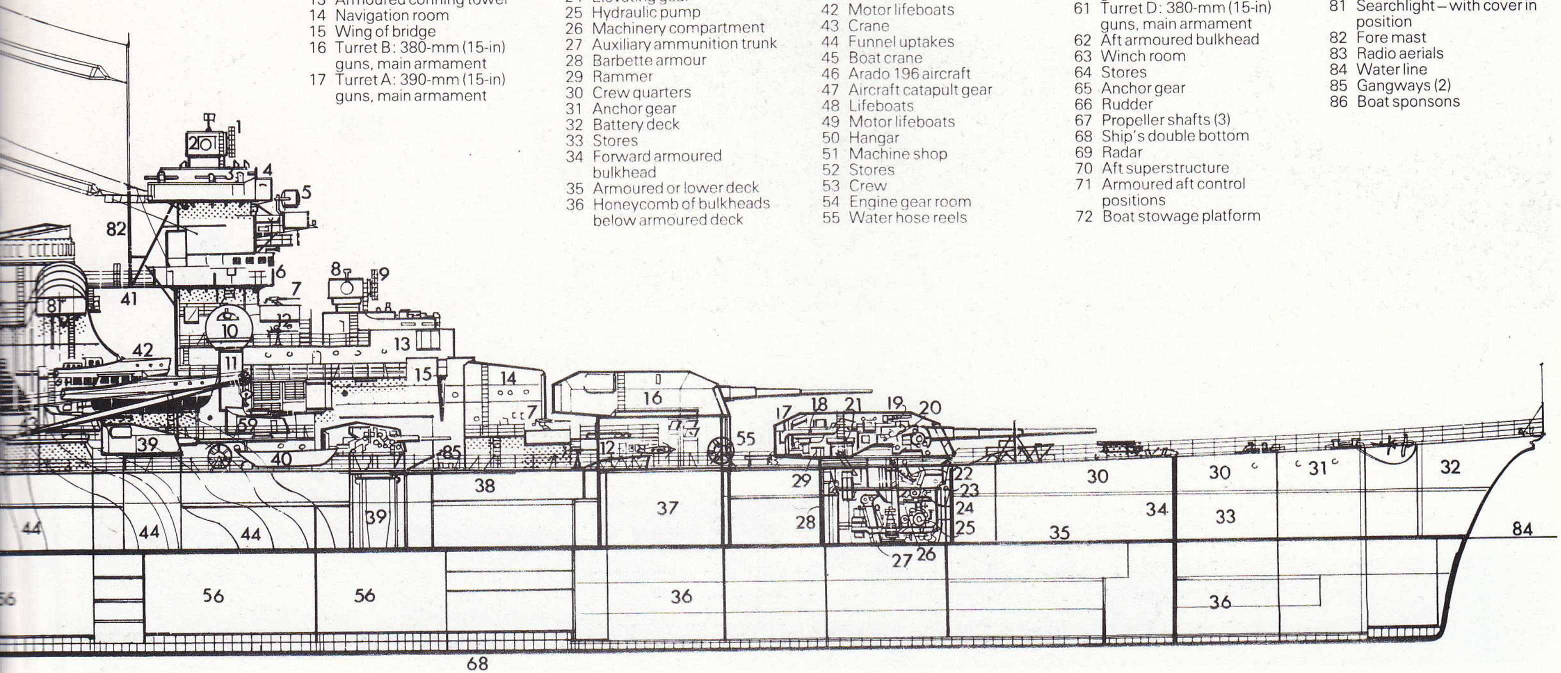


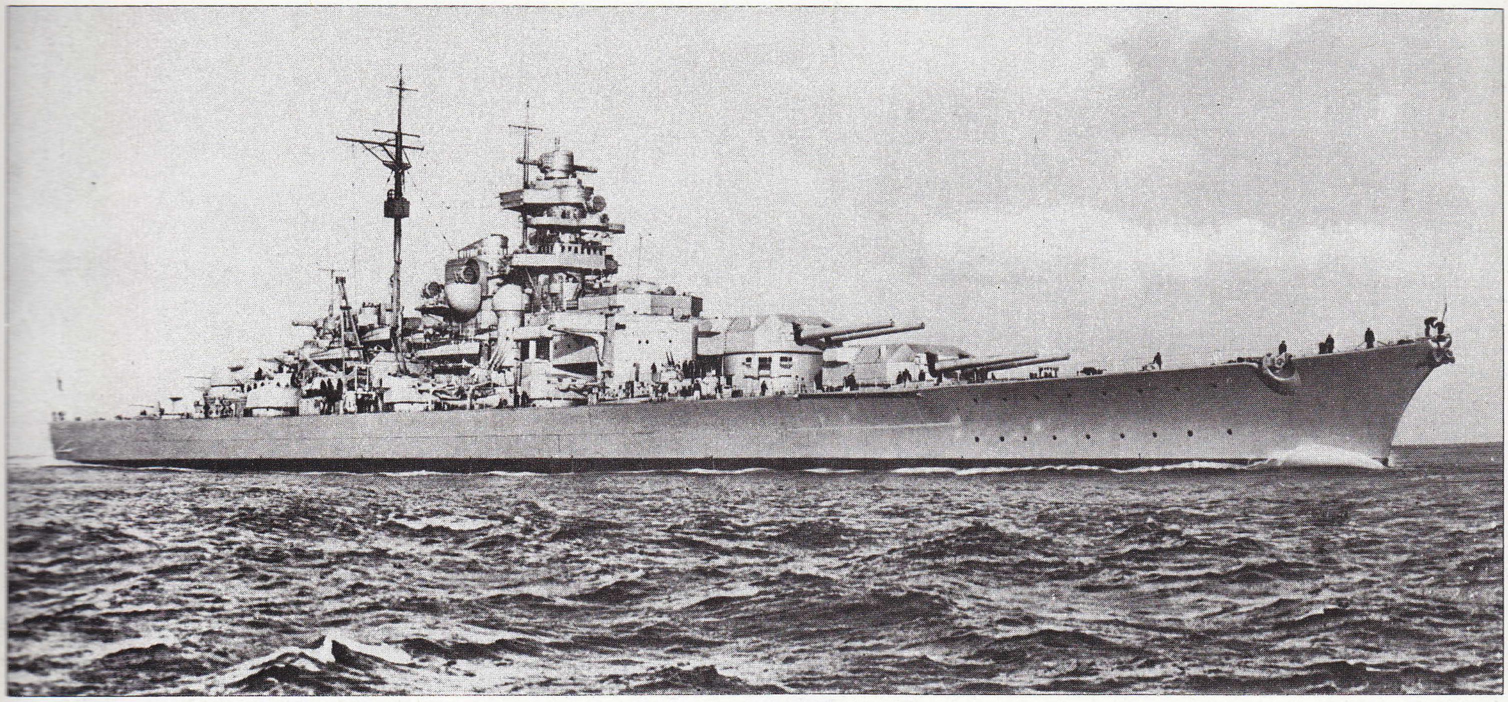
Left:* Bismarck *in action with the* Prince of Wales *on 24 May 1941.



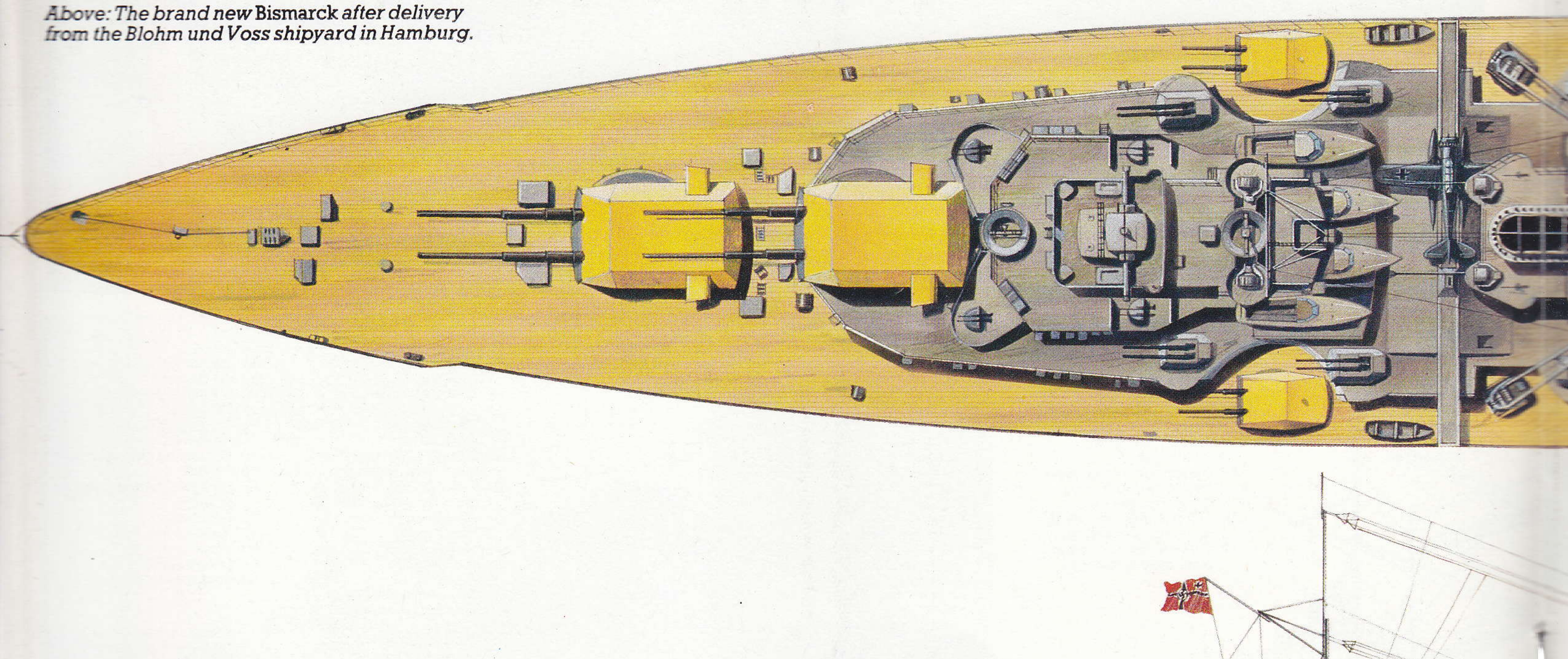
KMS *Bismarck* (c. May 1941) cutaway drawing key

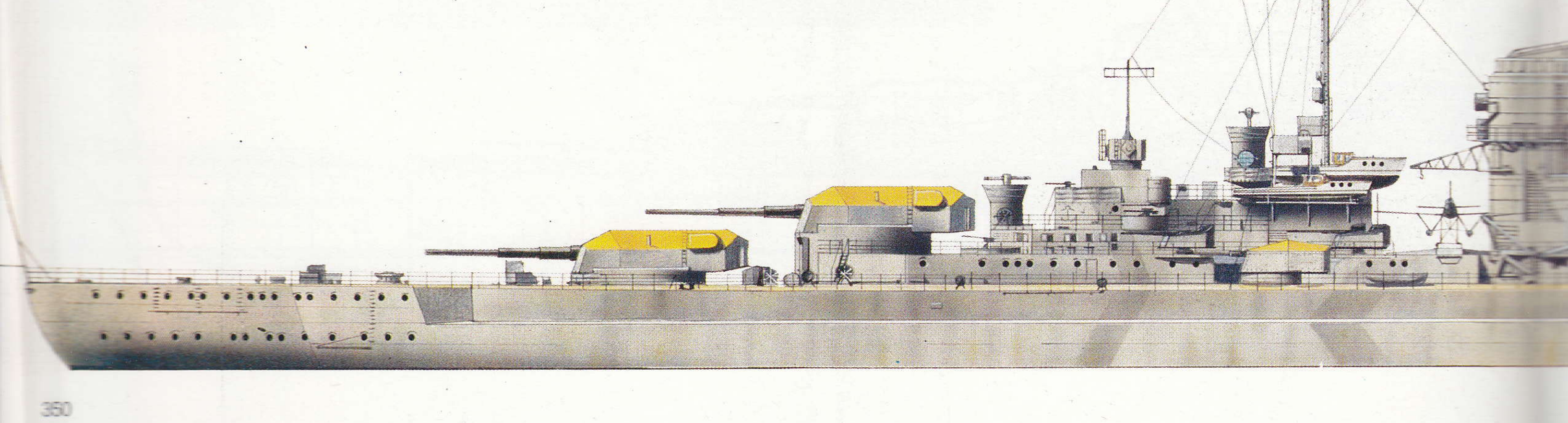
1 Radar
2 Range finder
3 Armoured control tower
4 Admiral's bridge
5 Searchlight
6 Day bridge
7 37-mm gun
8 Rangefinder
9 Radar
10 Gimbal-mounted AA Director stabilized by small gyros
11 AA command post
12 20-mm gun
13 Armoured conning tower
14 Navigation room
15 Wing of bridge
16 Turret B: 380-mm (15-in) guns, main armament
17 Turret A: 390-mm (15-in) guns, main armament
18 Exhaust trunking
19 Gunsight telescope
20 Breech mortice
21 Shell tray
22 Toothed elevating gear
23 Training base on ball bearings
24 Elevating gear
25 Hydraulic pump
26 Machinery compartment
27 Auxiliary ammunition trunk
28 Barbette armour
29 Rammer
30 Crew quarters
31 Anchor gear
32 Battery deck
33 Stores
34 Forward armoured bulkhead
35 Armoured or lower deck
36 Honeycomb of bulkheads below armoured deck
37 Barbette B turret (main armament)
38 Machine shop
39 Barbette: secondary armament 150-mm (5.9-in) guns
40 Lifeboats
41 Catwalk
42 Motor lifeboats
43 Crane
44 Funnel uptakes
45 Boat crane
46 Arado 196 aircraft
47 Aircraft catapult gear
48 Lifeboats
49 Motor lifeboats
50 Hangar
51 Machine shop
52 Stores
53 Crew
54 Engine gear room
55 Water hose reels
56 Engine and boiler rooms
57 Anti-aircraft control
58 Aft ensign mast
59 Barbette: secondary armament 105-mm (4.1-in) guns
60 Turret C: 380-mm (15-in) guns, main armament
61 Turret D: 380-mm (15-in) guns, main armament
62 Aft armoured bulkhead
63 Winch room
64 Stores
65 Anchor gear
66 Rudder
67 Propeller shafts (3)
68 Ship's double bottom
69 Radar
70 Aft superstructure
71 Armoured aft control positions
72 Boat stowage platform
73 Searchlight
74 AA control
75 Signalling lamp
76 Mainmast
77 Spotting positions
78 Rudder pointer
79 Remote control searchlight
80 Funnel
81 Searchlight – with cover in position
82 Fore mast
83 Radio aerials
84 Water line
85 Gangways (2)
86 Boat sponsons





Above: The brand new Bismarck *after delivery from the Blohm und Voss shipyard in Hamburg.*





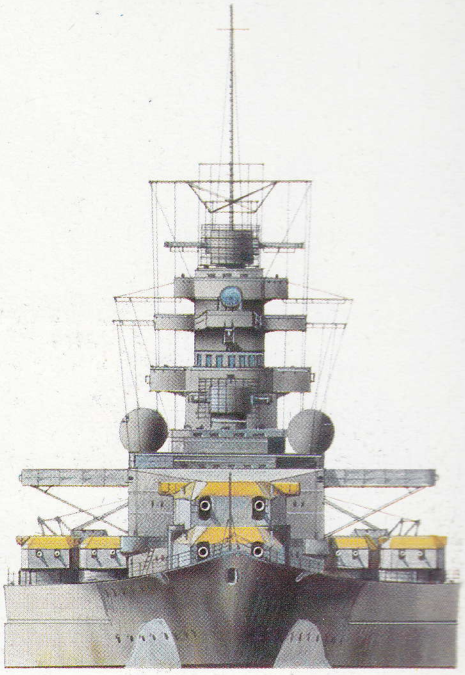
In fact *Rodney*'s inexperienced gun-crews were not firing fast and her shoot got more ragged, so the commander-in-chief, Admiral Sir John Tovey, ordered her to go in close, 3650 m (4,000 yards) or less, while he took the flagship out to 12800 m (14,000 yards), where her plunging salvoes of 356-mm (14-in) shells were more likely to penetrate the enemy's decks. This avalanche of fire silenced the *Bismarck* within half an hour, and by 09.20 only one after turret was still firing, under local control. Hits had destroyed the fire-control positions, fires were raging below decks, and communications with the engine rooms and compartments below the armoured deck had been lost.

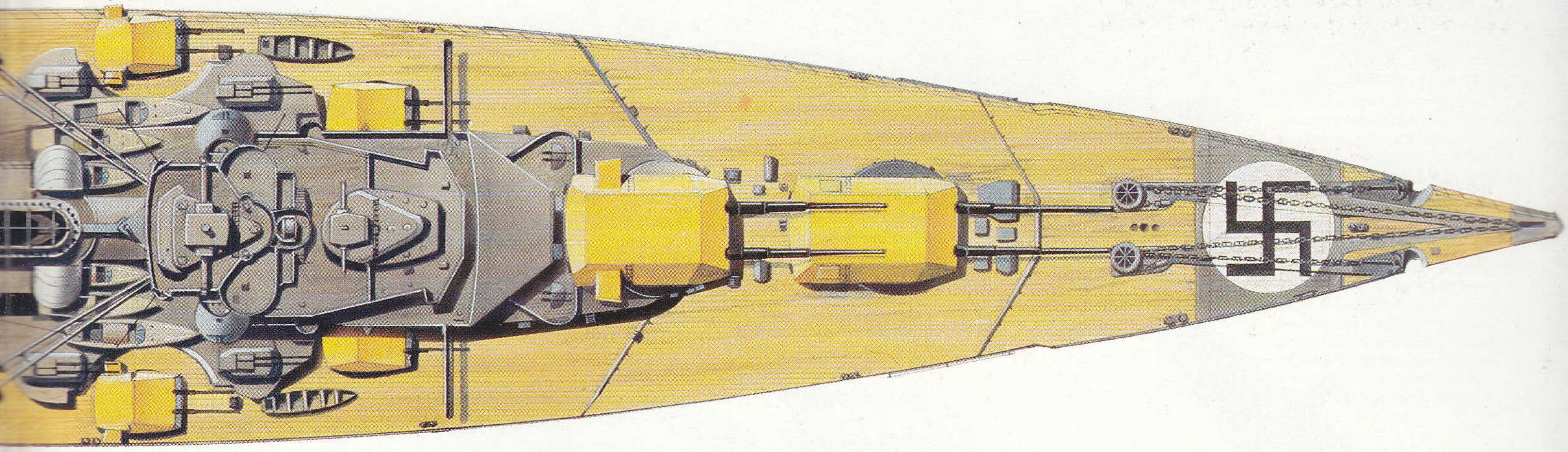
Defiant to the last

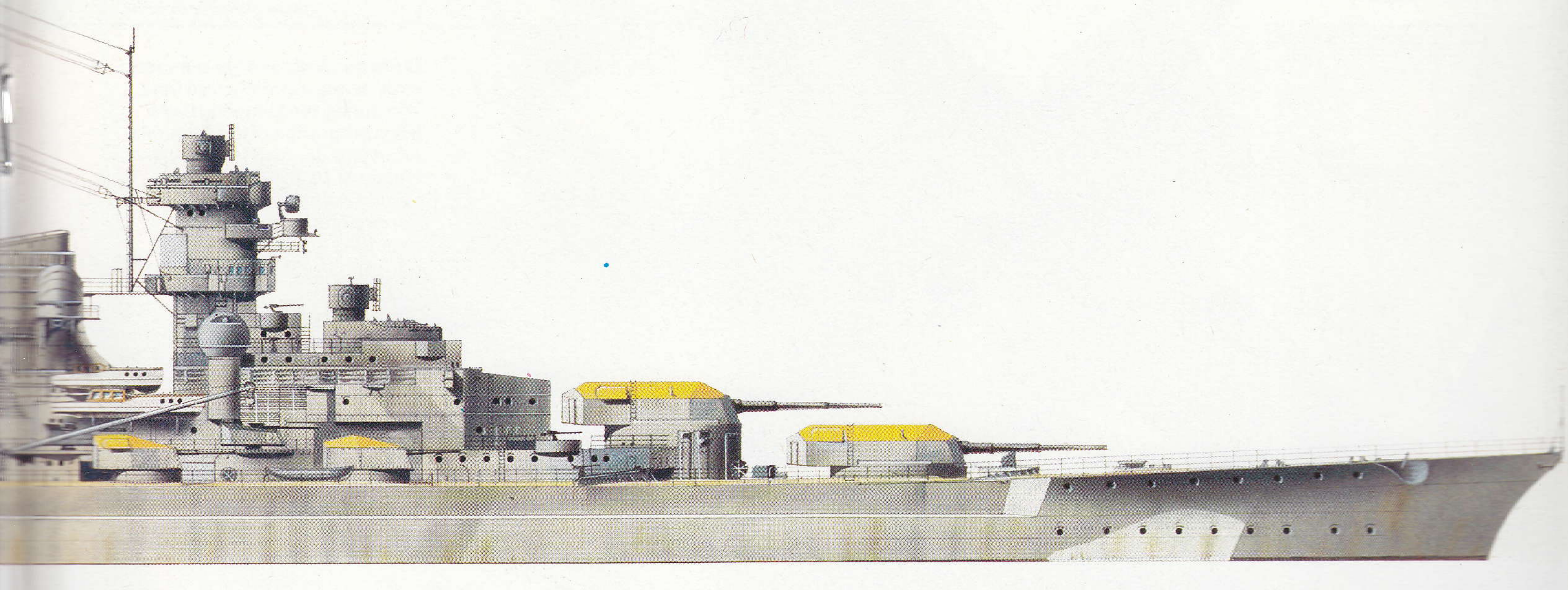
Paradoxically the damage was so extensive that it made the ship harder to sink. The *Bismarck*'s armoured deck was low down, to provide protection against long-range shellfire, and by 09.30 the ship was so waterlogged that most of the British shells were passing straight over the deck. In years to come a myth grew up that the ship's armour was never penetrated and that she only sank because she was scuttled, but the testimony of survivors in Admiralty records indicate that the British shells did immense internal damage, and all communication with personnel below the armoured deck had become impossible within the first 30 minutes. The argument is rather futile, because it rests on 'evidence' from personnel who did not survive. Gunfire is an efficient method of disabling a warship but it has always been a slow method of sinking one, unless a magazine explosion can be caused.

The *King George V* and the *Rodney* were both running low on fuel after the long chase, and so the heavy cruiser *Dorsetshire* was ordered to sink the *Bismarck* with torpedoes. At 10.15 she fired two 533-mm (21-in) 'tin fish' into the starboard side, and then at 10.35 a third into the port side. The *Bismarck* began to heel over slowly and sank by the stern in about five minutes. Her flag remained flying to the end, as she sank with the loss of Admiral Lütjens, Captain Lindemann and practically her entire crew. Rescue operations began immediately but were broken off for fear of U-boats, and only 115 men survived out of a total of 2,192.

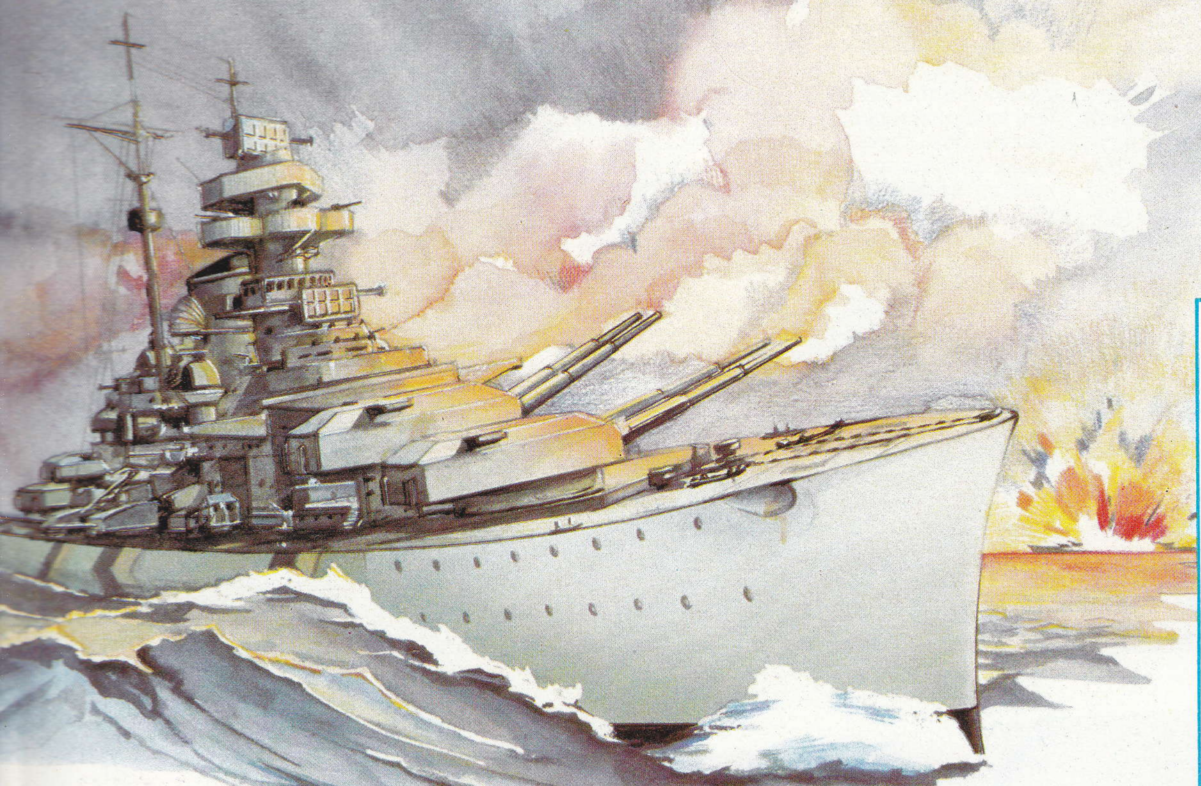
Below:* Bismarck *in May 1941. The bright dazzle camouflage worn while in Bergen has been toned down considerably, but is still visible.







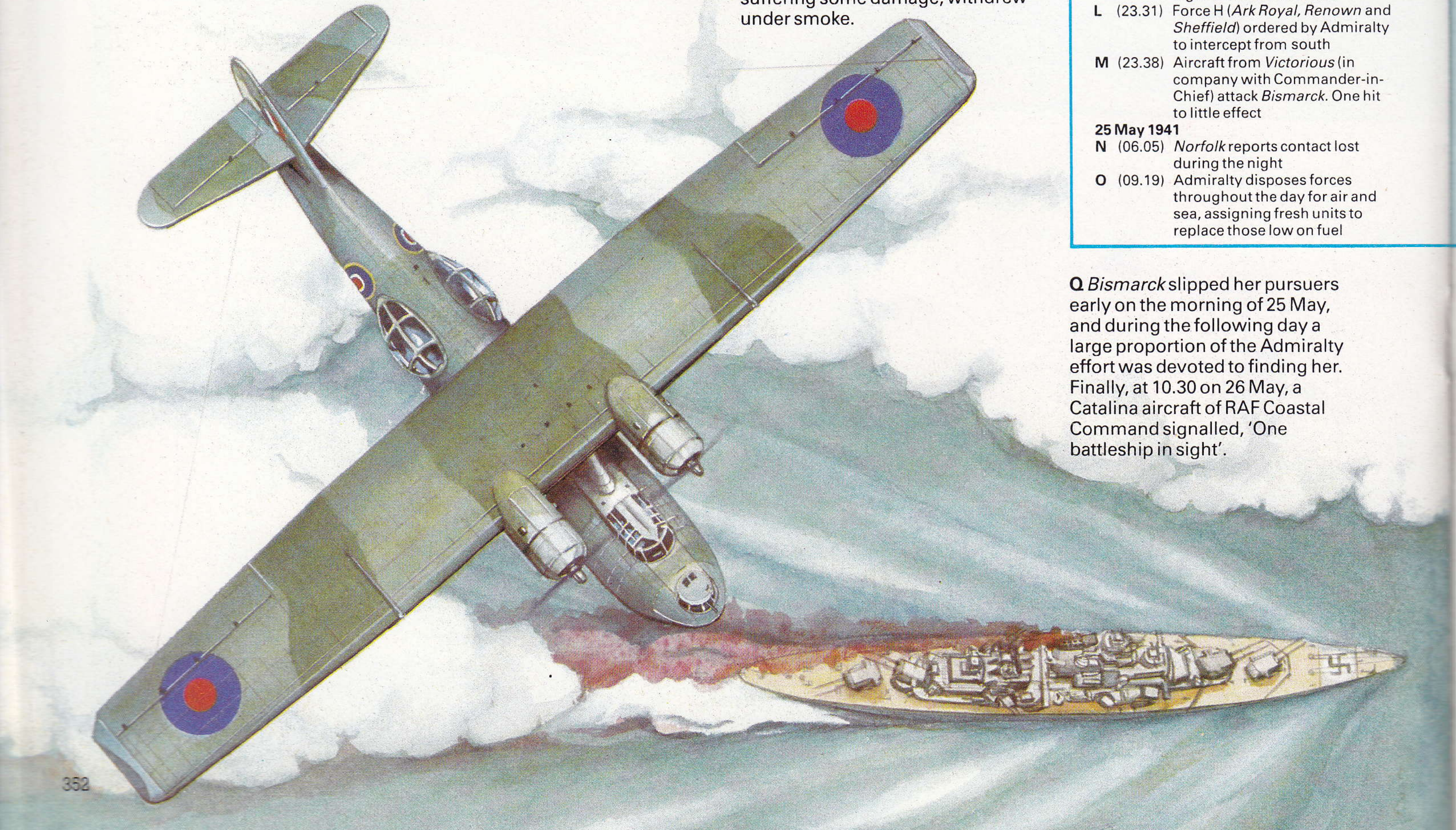
The Sinking of the *Bismarck*



22 May 1941

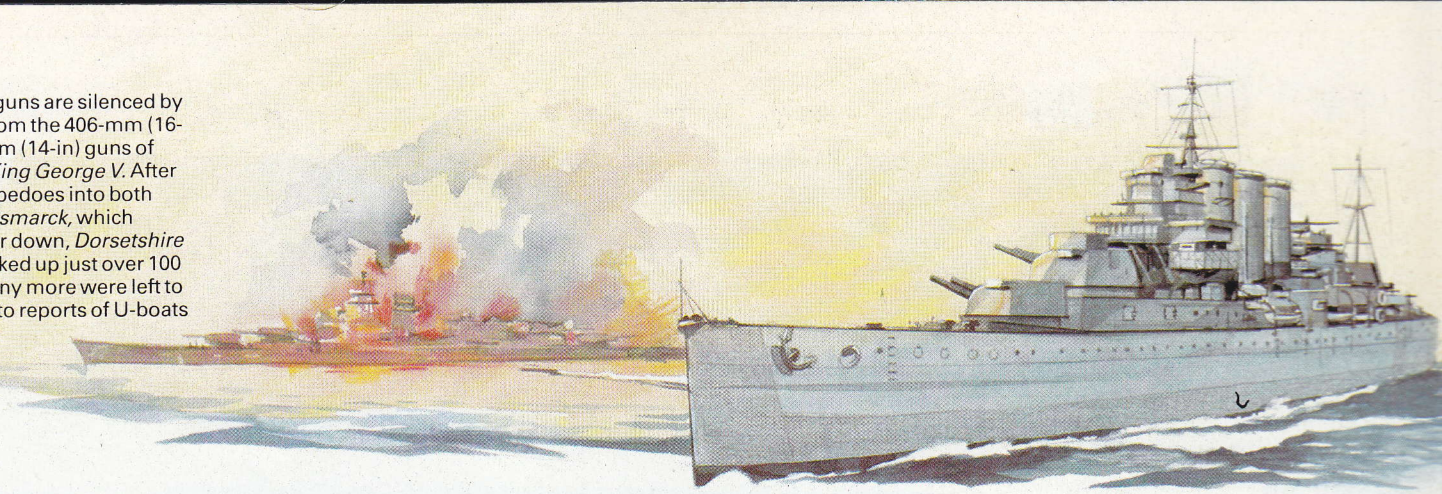
	time	
A	(19.39)	Reconnaissance shows that *Bismarck* and *Prinz Eugen* have left Bergen
B	(20.45)	Admiral Tovey, Commander-in-Chief, Home Fleet, puts to sea in *King George V*
23 May 1941		
C	(19.22)	One battleship and one cruiser sighted by *Norfolk* in company with *Suffolk*. The cruisers shadow *Bismarck* through the night
24 May 1941		
D	(05.37)	*Prince of Wales* sights *Bismarck* at 17 miles
E	(05.52)	*Bismarck* engages *Hood* and *Prince of Wales*
F	(06.14)	*Norfolk* reports *Hood* blown up
G	(06.37)	*Norfolk* orders destroyers to search for survivors; only three landed at Reykjavik by *Electra*
H	(08.01)	*Bismarck* reports engine and boiler room damage
I	(10.36)	Admiralty directs *Rodney* from convoy duty to join chase. Various changes in fleet disposition made throughout the day. *Norfolk* and *Suffolk*, with *Prince of Wales*, continue to shadow *Bismarck*
J	(18.32)	*Bismarck* and *Prince of Wales* exchange fire at long range
K	(20.56)	*Bismarck* reports failure to shake off shadowers and its intention to do so during the night and head for Brest
L	(23.31)	Force H (*Ark Royal*, *Renown* and *Sheffield*) ordered by Admiralty to intercept from south
M	(23.38)	Aircraft from *Victorious* (in company with Commander-in-Chief) attack *Bismarck*. One hit to little effect
25 May 1941		
N	(06.05)	*Norfolk* reports contact lost during the night
O	(09.19)	Admiralty disposes forces throughout the day for air and sea, assigning fresh units to replace those low on fuel

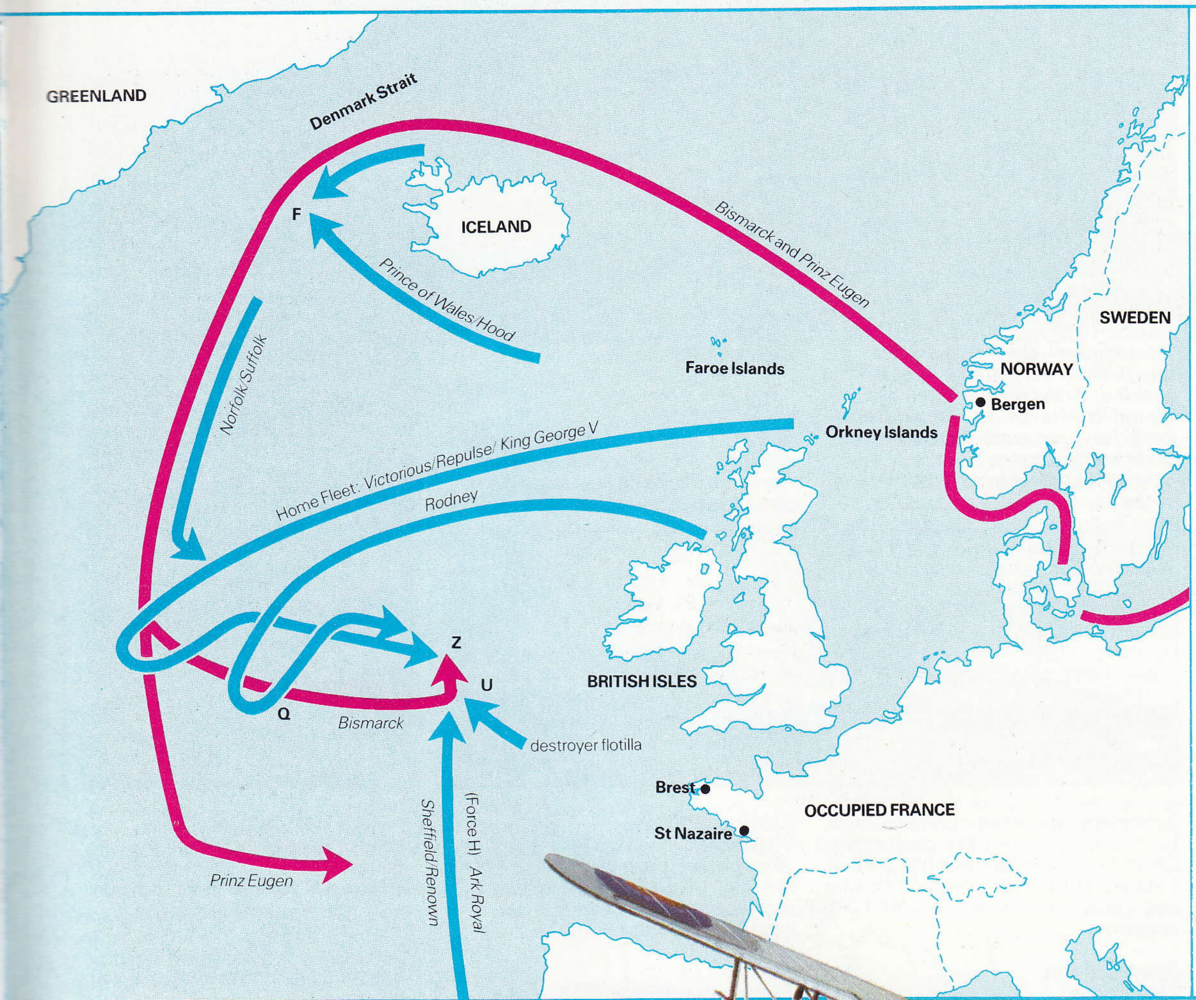
F Admiral Holland, knowing the vulnerability of his vessel to plunging fire, aimed to close the range with *Bismarck* as quickly as possible. However, within minutes of the engagement opening, *Hood* exploded, leaving only three survivors. *Prince of Wales,* suffering some damage, withdrew under smoke.



Q *Bismarck* slipped her pursuers early on the morning of 25 May, and during the following day a large proportion of the Admiralty effort was devoted to finding her. Finally, at 10.30 on 26 May, a Catalina aircraft of RAF Coastal Command signalled, 'One battleship in sight'.

Z *Bismarck's* guns are silenced by a pounding from the 406-mm (16-in) and 356-mm (14-in) guns of *Rodney* and *King George V*. After launching torpedoes into both sides of the *Bismarck*, which finally sent her down, *Dorsetshire* and *Maori* picked up just over 100 survivors. Many more were left to their fate due to reports of U-boats in the vicinity.



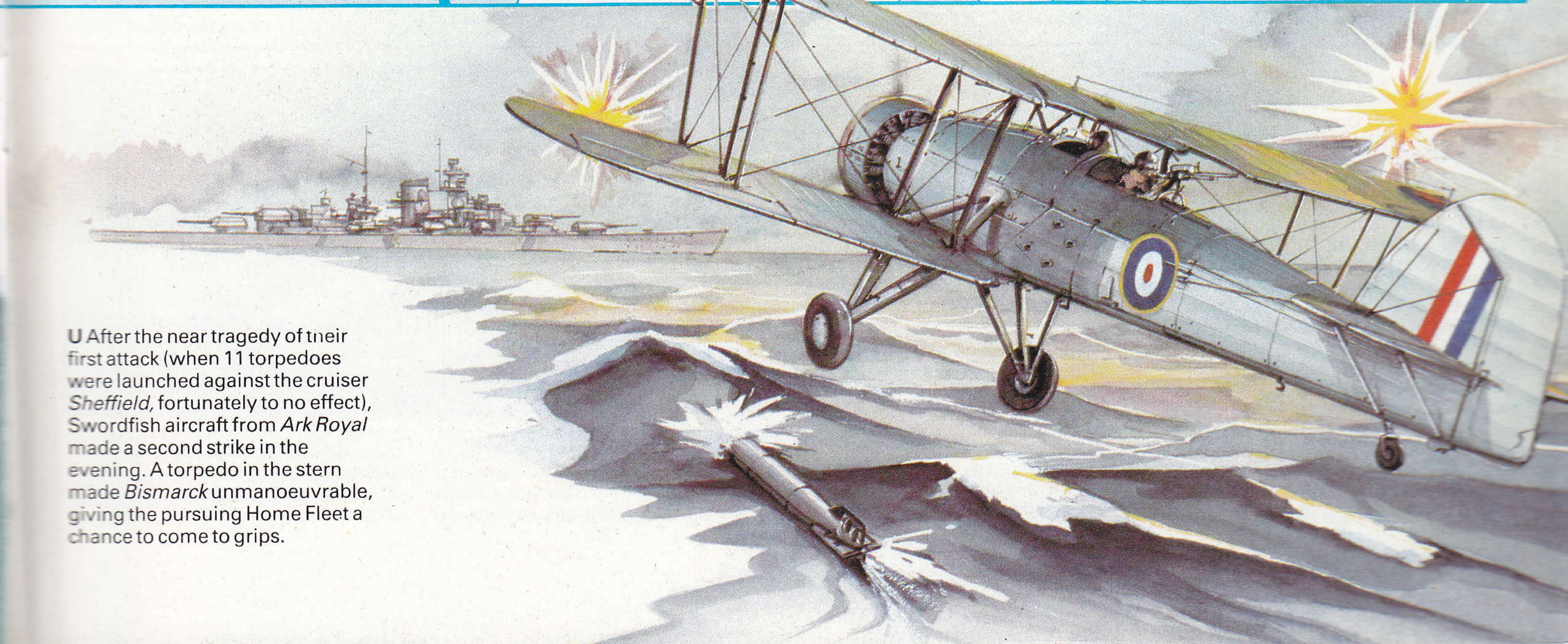

GREENLAND
Denmark Strait
ICELAND
F
Bismarck and Prinz Eugen
Prince of Wales/Hood
Norfolk/Suffolk
Faroe Islands
SWEDEN
NORWAY
Bergen
Orkney Islands
Home Fleet: Victorious/Repulse/ King George V
Rodney
Z
U
Q
Bismarck
BRITISH ISLES
destroyer flotilla
Brest
St Nazaire
OCCUPIED FRANCE
(Force H) Ark Royal
Sheffield/Renown
Prinz Eugen

26 May 1941

P	(00.36)	*Nelson* directed north from Cape Town, while other vessels are sent to cover likely interception points. *Prinz Eugen* makes for France
Q	(10.30)	Catalina aircraft from No. 209 Sqn, RAF Coastal Command sights 'one battleship'
R	(11.01)	Force H launches shadowing aircraft from *Ark Royal*
S	(11.15)	Shadowing aircraft sight *Bismarck*
T	(15.00)	*Sheffield*, shadowing *Bismarck*, mistakenly comes under attack by aircraft launched from *Ark Royal*
U	(18.50)	*Ark Royal* launches a second air strike. 4th Destroyer Flotilla (*Cossack, Zulu, Maori* and *Sikh*) joins Force H at 19.10
V	(19.50)	*Bismarck* reports carrier attack, and by 20.15 a torpedo attack has jammed its steering, making it impossible to manoeuvre

27 May 1941

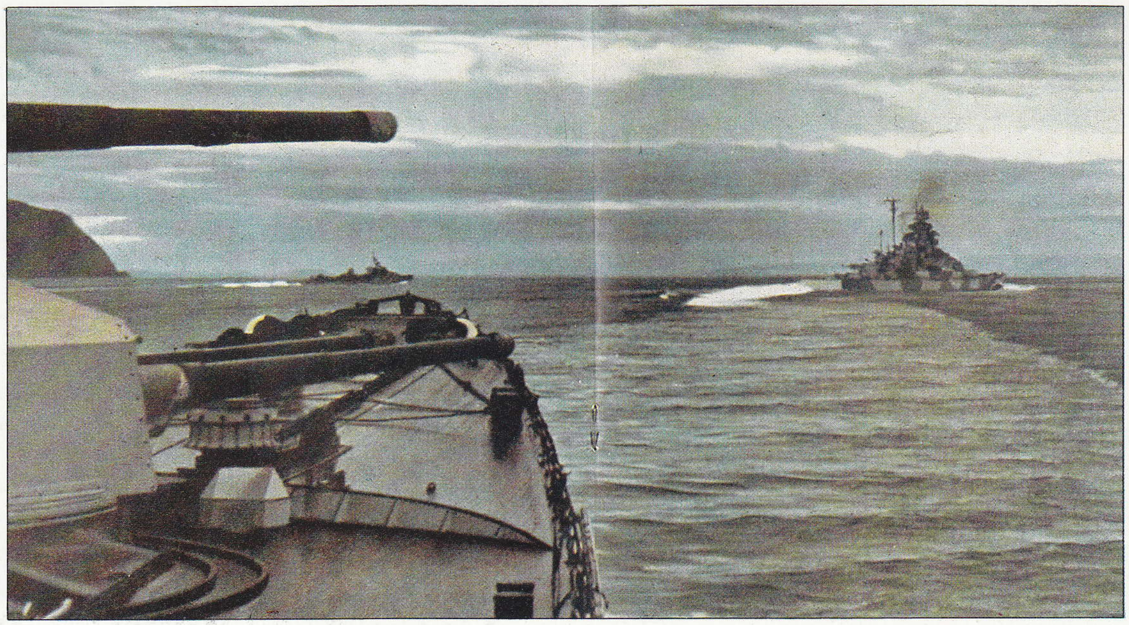
W	(01.22)	4th Destroyer Flotilla delivers a torpedo attack. *Sikh* reports *Bismarck* stopped at 02.34
X	(08.47)	*Rodney* and *King George V* sight *Bismarck* and open fire. Salvos of 356-mm (14-in) and 406-mm (16-in) shells batter *Bismarck* into a blazing hulk
Y	(10.28)	Commander-in-Chief has to discontinue action due to lack of fuel. All ships with torpedoes are ordered to use them
Z	(11.07)	*Dorsetshire* signals, 'I torpedoed *Bismarck* both sides before she sank. She had ceased firing, but her colours were still flying.' A little over 100 survivors were picked up



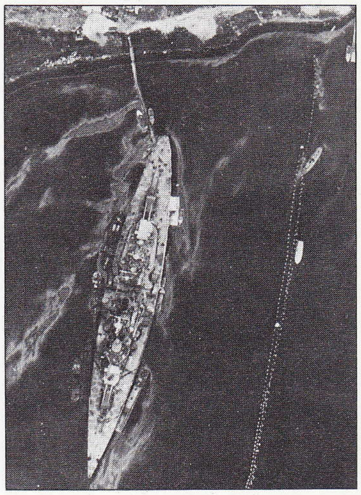
U After the near tragedy of their first attack (when 11 torpedoes were launched against the cruiser *Sheffield*, fortunately to no effect), Swordfish aircraft from *Ark Royal* made a second strike in the evening. A torpedo in the stern made *Bismarck* unmanoeuvrable, giving the pursuing Home Fleet a chance to come to grips.

GERMANY

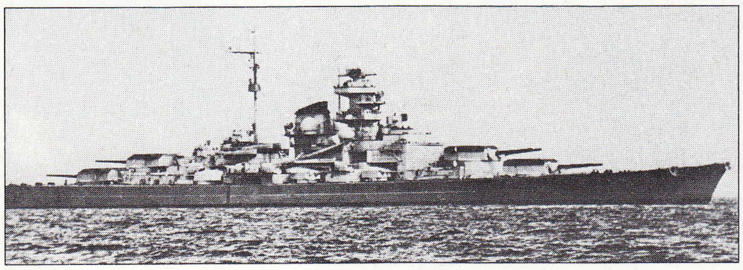
KMS *Tirpitz*



Above: Seen sailing in coastal waters, Tirpitz *(or possibly a 'Hipper' class cruiser – the designs were intentionally very similar) was a constant threat to Allied convoys bound for Murmansk. Considerable Royal Navy resources had to be tied down on the chance that the powerful battleship might make a strike.*



Right: The Tirpitz *in Kaafjord in March 1944, seen from an RAF aircraft 3,000 feet up.*



Below: When completed the Tirpitz *differed only in minor details from her sister* Bismarck*, but more AA guns were added later.*

KMS *Tirpitz* was laid down in October 1936 as *Schlachtschiff G*, launched on 1 April 1939 and started sea trials in late February 1941. She was in most respects identical to her sister *Bismarck* but incorporated minor improvements, notably the addition of two sets of quadruple torpedo-tubes and improved aircraft-handling arrangements.

After a lengthy work-up in the Baltic the *Tirpitz* was ready for operational service towards the end of September 1941, and her first operation was a cruise in the Gulf of Finland to prevent any breakout by the Soviet Baltic Fleet. She was then sent to Trondheim in Norway to disrupt Allied convoys to Murmansk, but on her first sortie she failed to find the convoy and narrowly escaped damage from Fairey Albacore torpedo-bombers from HMS *Victorious* on 9 March. Her next move was much more successful, but inadvertent, for shift of berth led the British to think that she was putting to sea. As a result the convoy PQ-17 was ordered to scatter, allowing U-boats and bombers to sink 24 merchant ships.

Although the *Tirpitz* never made another sortie her presence could not be ignored, and the Royal Navy was forced to keep two capital ships and a fleet carrier in home waters in case the *Tirpitz* should break out. The first of a long series of attempts to neutralize her was an attack by 'Chariot' human torpedoes in October 1942, but this achieved nothing as the Chariots were lost by accident. In September 1943 the *Tirpitz* put to sea once more, but only to bombard Spitzbergen. Late that month two British X-craft or midget submarines penetrated the defences of Altenfjord and laid 2-ton charges under the *Tirpitz* keel, causing extensive shock damage to the 380-mm (15-in) turrets and the main machinery.

Repairs lasted until the spring of 1944 but just as the battleship was getting under way on 3 April she was attacked by 40 Fairey Barracuda dive-bombers from British carriers. This Fleet Air Arm attack inflicted serious damage, but two later attacks in July and August did very little damage, for the steep sides of the fjord made accurate bombing almost impossible. Finally, on 15 September, RAF Avro Lancasters managed to hit the *Tirptiz* with 5443-kg (12,000-lb) bombs, causing severe damage. The *Tirpitz* then had to be moved south to Trondheim for repairs, where two more attacks by Lancasters achieved her destruction. On 12 November she was hit by three 5443-kg (12,000-lb) 'Tallboy' bombs and capsized with the loss of 1,000 crewmen.

Specification

KMS *Tirpitz*

Displacement: 42,900 tons standard, 52,600 tons full load

Dimensions: length 250.5 m (821 ft 10 in) overall; beam 36.0 m (118 ft 1 in); draught 11.0 m (36 ft 1 in) maximum

Machinery: 3-shaft geared steam turbines delivering 138,000 shp (102907 kW)

Speed: 29 kts

Armour: belt 320 mm (12.6 in); decks 50-120 mm (2-4.7 in); turrets and barbettes 230-355 mm (9-14 in)

Armament: eight 380-mm (15-in), 12 150-mm (5.9-in), 16 105-mm (4.1-in) AA, 16 37-mm AA and 70 20-mm AA guns, and eight 533-mm (21-in) torpedo tubes

Aircraft: four Arado floatplanes

Complement: 2,530 officers and men

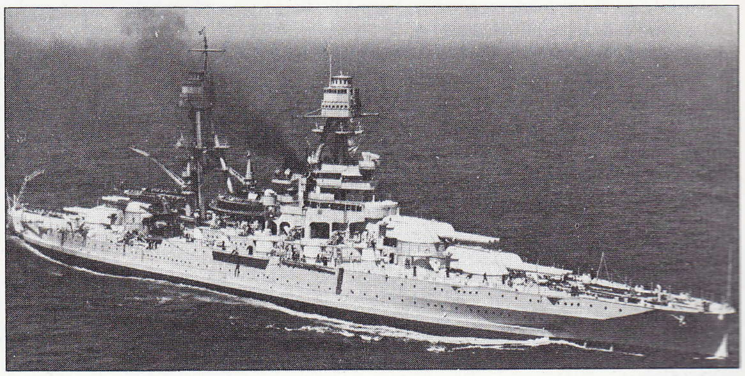
USA

USS *Arizona*

The USS *Arizona* (BB.39) was laid down in March 1914, launched in June 1915 and commissioned in October 1916. She crossed the Atlantic to serve with the 6th Squadron as part of the British Grand Fleet in the last days of World War I, and then helped to repatriate American soldiers from France. In 1929-31 she was modernized, and on 7 December 1941 was part of the Pacific Fleet, lying in 'Battleship Row' in Pearl Harbor.

Her peacetime service had been humdrum. After a short trip to the Mediterranean in April-July 1919 she returned to the East coast, and then transferred to the Pacific Fleet in 1921 for a period of eight years. In 1929 she returned to Norfolk to start her modernization, and on recommissioning took President Hoover on a cruise to the West Indies before passing through the Panama Canal on her way back to the Pacific Fleet. There she remained for the rest of her life.

The first wave of Japanese aircraft to reach Pearl Harbor on 7 December had no difficulty in identifying their targets, for 'Battleship Row' contained seven ships: USS *Oklahoma*, USS *West Virginia* and the repair ship USS *Vestal* in the outer line, and USS *Maryland*, USS *Tennessee*, the *Arizona* and USS *Nevada* in the inner line. A torpedo and an estimated eight bombs hit the *Arizona*, setting her on fire and starting a massive flooding. The bomb which did most damage was a 725-kg (1,600-lb) weapon which struck at 08.10, penetrated the armoured deck and detonated in the forward magazine. The ship blew up and sank at her



The USS Arizona *in September 1939. During modernization her 'basket' masts had been replaced by massive tripods.*

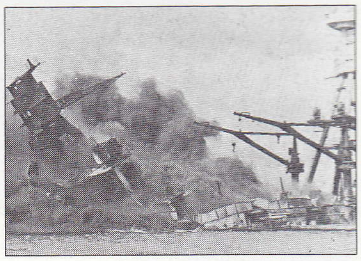
moorings, trapping and killing a total of 1,104 of her crew, including Rear Admiral Kidd and Captain van Valkenburgh.

Salvage teams tried to raise the hull, but it was damaged beyond repair. Subsequently two of the *Arizona*'s triple 356-mm (14-in) turrets were recovered and the guns were installed in coast defence positions on land. The hull of the *Arizona* was later declared a national shrine commemorating the men and ships lost in the attack. Today a concrete memorial has been built over the *Arizona*'s remains, and an oil slick shows that oil is still leaking slowly from her fuel tanks.

The sister of the *Arizona*, USS *Pennsylvania* (BB.38) was in dry dock at the time and suffered only superficial damage from a single bomb hit. After repairs and modernization she rejoined the Pacific Fleet and saw action across the Pacific, through to the Japanese surrender in August 1945. Right at the end of the war she was damaged by an aircraft torpedo but survived and was used as a target in the Bikini nuclear tests in 1946.

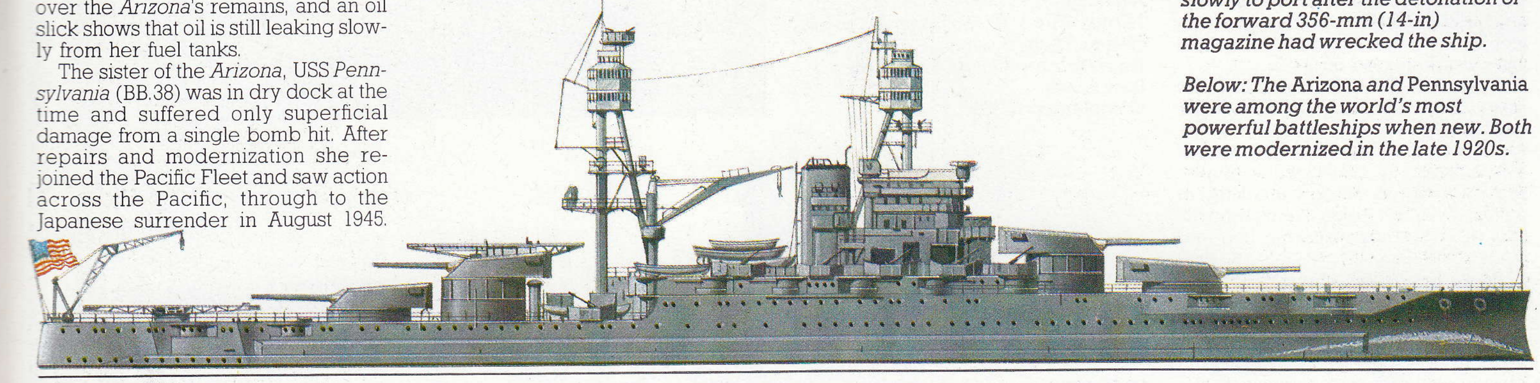
Specification

USS *Arizona* (BB.39)
Displacement: 32,600 tons standard, 36,500 tons full load
Dimensions: length 185.32 m (608 ft); beam 29.56 m (97 ft); draught 8.76 m (28 ft 9 in)
Machinery: 4-shaft geared steam turbines delivering 33,500 shp (24980 kW)
Speed: 21 kts
Armour: belt 356 mm (14 in); deck 203 mm (8 in); turrets 229-457 mm (9-18 in)
Armament: 12 356-mm (14-in), 12 127-mm (5-in), 12 127-mm (5-in) AA and eight 12.7-mm (0.5-in) AA guns
Aircraft: three floatplanes
Complement: 2,290 officers and men



The Arizona's tripod masts sags slowly to port after the detonation of the forward 356-mm (14-in) magazine had wrecked the ship.

Below: The* Arizona *and* Pennsylvania *were among the world's most powerful battleships when new. Both were modernized in the late 1920s.



USA

USS *Washington*

When the 15-year 'holiday' in battleship construction came to an end in 1937, the US Navy had plans to lay down two modern capital ships as soon as possible. The 35,000-ton limit was still in force, but the 1936 London Naval Treaty had reduced gun calibre from 406 to 356 mm (16 to 14 in). The specification which emerged was very similar to the original design of HMS *King George V*, with three quadruple 356-mm (14-in) mountings and a speed of 28 kts. However, unlike the British the Americans could afford to wait, and when the Japanese refused to ratify the 1936 treaty the USN announced that it would exercise its right to go back to 406-mm (16-in) guns. On the dimensions it was only possible to have three triple mountings, and nothing could be done to increase protection, which had been planned to withstand 356-mm (14-in) shellfire.

USS *Washington* (BB.56) was the second of the two 'North Carolina' class; she was laid down in June 1938 and commissioned in May 1941. She went to the Home Fleet for a while in 1942, and on 1 May was damaged by the explosion of HMS *Punjabi*'s depth charges after the destroyer had been rammed by HMS *King George V* just ahead of her. By September that year she was back in the Pacific, with Task Force 17 in the Solomons.

On the night of 14/15 November the *Washington* and USS *South Dakota* were stalking a Japanese task force attempting to bombard Henderson Field, but just before the US ships could open fire the blast of a 127-mm (5-in) gun knocked out the *South Dakota*'s electrical system. Fortunately the *Washington* had not yet switched on her searchlights, and remained undetected while the Japanese concentrated their fire on the *South Dakota*.

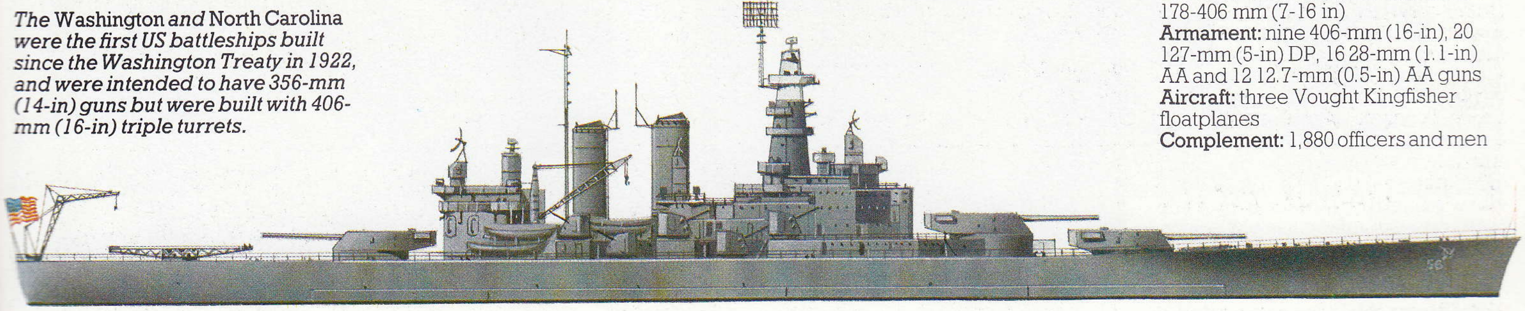
From a range of about 7315 m (8,000 yards) the *Washington* closed the range to 1830 m (2,000 yards) before opening fire; in seven minutes she fired 75 406-in (16-in) and hundreds of 127-mm (5-in) shells, crippling the *Kirishima* with nine 406-mm (16-in) hits. Her intervention saved the *South Dakota* from serious damage and not only sank the *Kirishima* but badly damaged two heavy cruisers as well and saved Henderson Field from bombardment.

On 1 February 1944 the *Washington* was badly damaged in a collision with the *Indiana*, but she was repaired in time for the Battle of the Philippine Sea in June 1944 and the final onslaught on Okinawa and the Japanese Home Islands. She was decommissioned in June 1947 and was stricken in 1960.

Specification

USS *Washington* (BB.56)
Displacement: 36,900 tons standard, 44,800 tons full load
Dimensions: length 222.12 m (728 ft 9 in) overall; beam 33.0 m (108 ft 3 in); draught 10.82 m (35 ft 6 in)
Machinery: 4-shaft geared steam turbines delivering 121,000 shp (90230 kW)
Speed: 27 kts
Armour: belt 165-305 mm (6.5-12 in); decks 38-140 mm (1.5-5.5 in); turrets 178-406 mm (7-16 in)
Armament: nine 406-mm (16-in), 20 127-mm (5-in) DP, 16 28-mm (1.1-in) AA and 12 12.7-mm (0.5-in) AA guns
Aircraft: three Vought Kingfisher floatplanes
Complement: 1,880 officers and men

The* Washington *and* North Carolina *were the first US battleships built since the Washington Treaty in 1922, and were intended to have 356-mm (14-in) guns but were built with 406-mm (16-in) triple turrets.



USA

USS *South Dakota*

The need for a class of battleships powerful enough to resist 406-mm (16-in) shellfire without infringing the 35,000-ton treaty limit was clear in 1937. To achieve this, however, was another matter, and the US Navy's designers were forced to make several compromises. Shortening the waterline length saved weight, but to support the additional weight of armour there had to be an increase in beam. This caused more drag, and to maintain a speed of 28 kts more power was needed, but in the shorter hull there was now less space for machinery. The problems were solved eventually by considerable attention paid to redesign of machinery, and as a result the 'South Dakota' class proved to be cost-effective. The short hull was manoeuvrable, and protection against shellfire, bombs and torpedoes was as good as any contemporary built to the same nominal limitations. In fact, like the British 'King George V' class, the 'South Dakota' class worked out at 38,000 tons, an 8.5 per cent difference, considerably lower than those of French, German or Italian designs.

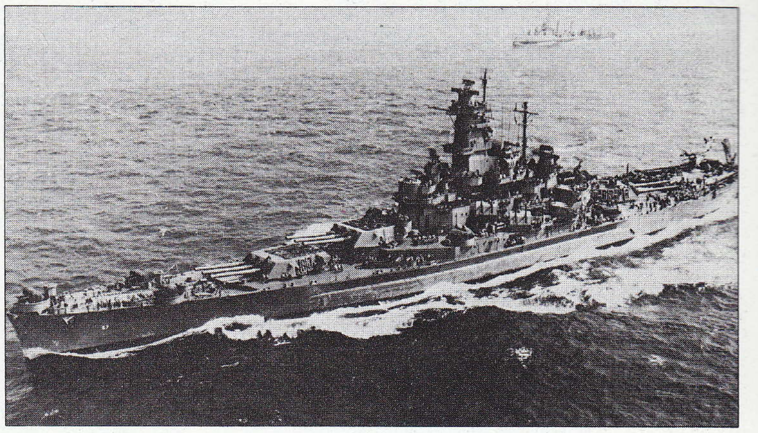
The lead-ship USS ***South Dakota*** (BB.57) was laid down in July 1939, launched in June 1941 and commissioned in March 1942. She went straight to the Pacific after her shakedown cruise, but damaged herself by running aground. Repairs were completed in time for the Battle of Santa Cruz, and on 26 October 1942 she claimed to have shot down 26 Japanese aircraft. This phenomenal performance can be explained by the fact that she was the first ship to use the new proximity-fused 127-mm (5-in) shells.

The next engagement was the Battle

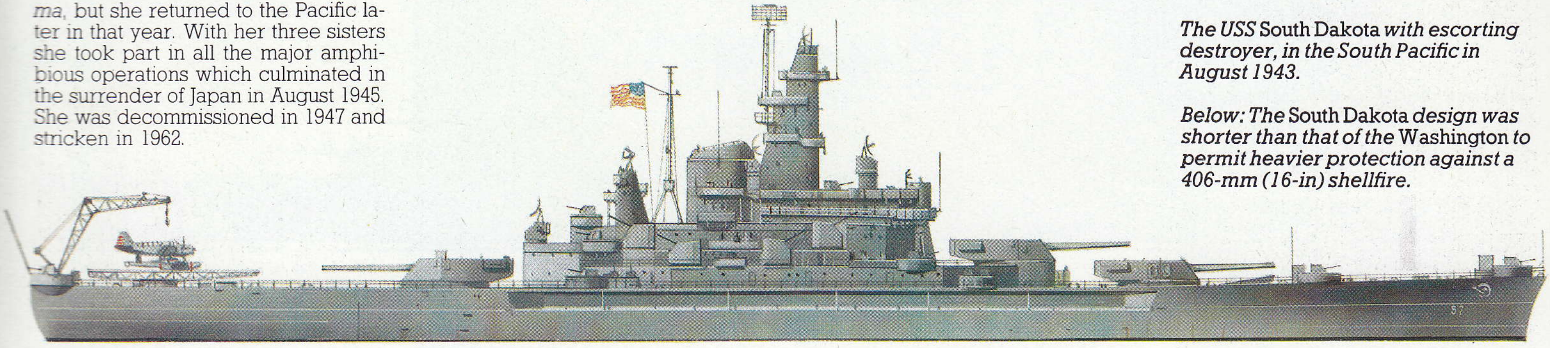
of Guadalcanal on the night of 14/15 November 1942, but this time the *South Dakota* was less successful. While approaching the Japanese battle line in company with USS *Washington* she inadvertently blew the ring main and put her entire electrical supply out of action. With no radar, fire control, lighting or navigation aids she blundered towards the Japanese and got within 4570 m (5,000 yards), at which range she was soon hit by a number of shells. She was hit by one 356-mm (14-in), 18 203-mm (8-in), six 152-mm (6-in) and one 127-mm (5-in) shells, plus one of unknown calibre, suffering extensive splinter damage which killed 38 men and wounded 60.

In 1943 the *South Dakota* joined the Home Fleet with her sister USS *Alabama*, but she returned to the Pacific later in that year. With her three sisters she took part in all the major amphibious operations which culminated in the surrender of Japan in August 1945. She was decommissioned in 1947 and stricken in 1962.

Specification
USS *South Dakota* (BB.57)
Displacement: 38,000 tons standard, 44,374 tons full load
Dimensions: length 207.3 m (680 ft) overall; beam 33.0 m (108 ft 3 in); draught 11.1 m (36 ft 3 in) maximum
Machinery: 4-shaft geared steam turbines delivering 130,000 shp (96940 kW)
Speed: 28 kts
Armour: belt 311 m (12.25 in); decks 38-127 mm (1.5-5 in); turrets 457 mm (18 in)
Armament: nine 406-mm (16-in), 16 127-mm (5-in) DP, 40 40-mm AA and 40 20-mm AA guns
Aircraft: three Vought Kingfisher floatplanes
Complement: 2,354



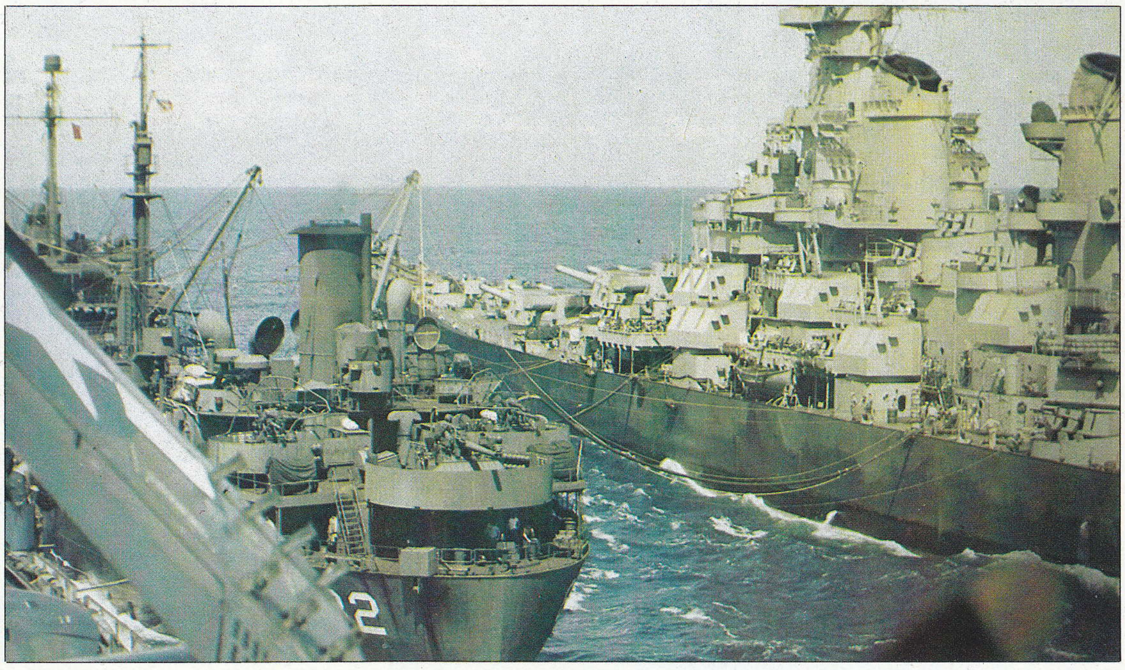
The USS South Dakota *with escorting destroyer, in the South Pacific in August 1943.*



Below: The South Dakota *design was shorter than that of the* Washington *to permit heavier protection against a 406-mm (16-in) shellfire.*

USA

USS *Iowa*



USS Iowa *refuels from an oiler in the Pacific. Although comparatively lightly armoured, its high speed and endurance gave this class great fighting power.*

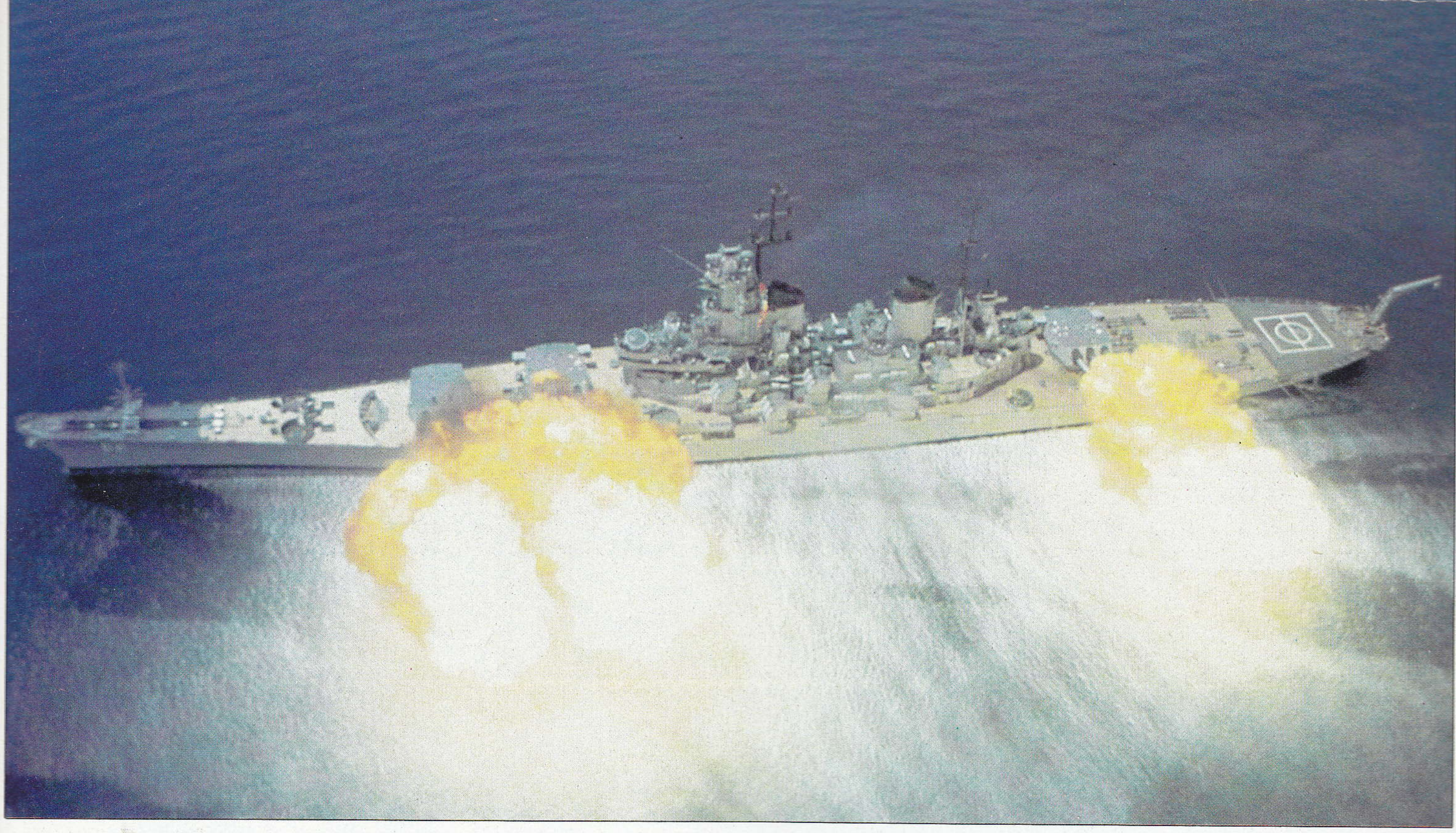
Early in 1937 the US Navy started work on the design of 45,000-ton battleships as a contingency against any Japanese refusal to continue the international treaty limits on displacement. In January 1938 emphasis switched from ships with heavy armament and protection but modest speed (12 406-mm/16-in guns, 27 knots) to fast designs, capable of 30 kts or more. The new 'Essex' class carriers were taking shape on the drawing board at this time, and there was a need to provide them with battleship escorts of similar performance.

The 'Iowa' class which resulted sacrificed gunpower (only nine 406-mm/16-in guns) and protection (310-mm/12.2-in belt armour) to permit the speed to be increased to 33 kts. Although intelligence sources suspected that the new Japanese battleships would have 457-mm (18-in) guns, it was hoped that the 'Iowa' class would not have to fight them as carrier aircraft would keep the Japanese giants outside gun-range. The 'Iowas' were primarily intended to keep heavy cruisers, rather than battleships, at bay, and as such they came close to the original concept of the battle-cruiser, although never rated as such.

The *Iowa* (BB.61) was laid down in June 1940, launched in August 1942 and commissioned in February 1943. In August of that year she escorted convoys from Newfoundland and then took President Roosevelt to North Africa, before being sent to the Pacific to join the 5th Fleet. She took part in the Marshall Islands landing, and suffered slight damage from Japanese artillery. At Leyte she was part of Vice Admiral William Halsey's Fast Carrier Force, and took part in the Okinawa landing; in July 1945 she bombarded targets on Hokkaido and Honshu, and was part of the enormous force anchored in Tokyo Bay for the Japanese surrender.

The *Iowa* was mothballed in 1949 but reactivated in 1951 for service in the Korean War. She carried out a large number of shore bombardments but was decommissioned once more in 1953. It was widely thought that she would be scrapped, but in 1981 she was towed to New Orleans to begin reactivation. In her new configuration she will carry a large number of Harpoon anti-ship missiles and Tomahawk cruise missiles to enable her to function as the main unit of a Surface Action Group (SAG). Her 406-in (16-in) guns are to be retained to provide gunfire support.

Specification
USS *Iowa* (BB.61)
Displacement: 48,500 tons standard, 57,450 tons full load
Dimensions: length 270.43 m (887 ft 3 in) overall; beam 32.97 m (108 ft 2 in); draught 11.58 m (38 ft)
Machinery: 4-shaft geared steam turbines delivering 212,000 shp (158088 kW)
Speed: 33 kts
Armour: belt 310 mm (12.2 in); decks 38-120 mm (1.5-4.7 in); turrets 457 mm (18 in)
Armament: nine 406-mm (16 in), 20 127-mm (5-in) DP, 60 40-mm AA and 60 20-mm AA guns
Aircraft: three Vought Kingfisher floatplanes
Complement: 1,921 officers and men



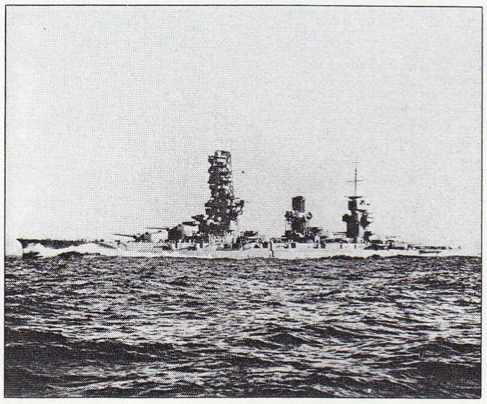
'Iowa' class battleships have been called out of retirement several times since World War II. Here USS New Jersey *uses the power of her 406-mm (16-in) guns in support of the US Army off Vietnam in 1968. The massive AA battery was largely removed or deactivated to save manpower.*

The Battle of Surigao Strait

The Battle of Surigao Strait was one of the four separate actions known collectively as the Battle of Leyte Gulf. As part of their *'Sho-I'* plan the Japanese had sent two detachments under Vice Admiral Nishimura (designated Force 'C' of the 1st Striking Force and the 2nd Striking Force) towards Surigao Strait. Force 'C' included the battleships IJN *Fuso* and IJN *Yamashiro*, and a heavy cruiser, while the 2nd Striking Force under Vice Admiral Shima had only three heavy cruisers. Their objective was the American amphibious forces off Samar, which were to be attacked in conjunction with Vice Admiral Takeo Kurita's 1st Striking Force, comprising the battleships IJN *Yamato, Musashi, Nagato, Kongo* and *Haruna* (Forces 'A' and 'B').

Nishimura entered Surigao Strait just after midnight on 24/25 October 1944. Two destroyers were leading the flagship *Yamashiro*, the *Fuso* and the heavy cruiser IJN *Mogami* in line ahead. The first American attacks by PT-boats were brushed aside, but the next line of defence was a group of destroyers, each armed with torpedoes. It was a confused action, but one destroyer's spread of five torpedoes must have hit the *Fuso* amidships, for she was seen to explode and break into two halves which drifted apart before they sank.

The final line of defence was Rear Admiral Jesse B. Oldendorf's Battle Line of six old battleships, USS *Tennessee, West Virginia, Mississippi, Maryland, California* and *Pennsylvania.* Five of them were veterans of Pearl Harbor, but all had been refitted with the latest fire-control and radar. Fire was opened by the *Tennessee* and *West Virginia* at 20850 m (22,800 yards), followed shortly afterwards by the flagship *Mississippi* and the *Maryland.*

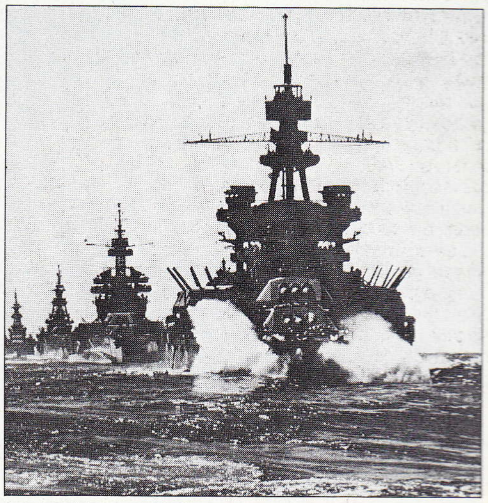


The newly constructed Japanese battleship Yamashiro *runs trials in 1934. Like other veterans her appearance was completely changed.*

For a while the *Yamashiro* seemed impervious to the hurricane of fire which lashed her as the controlled broadsides rumbled on. She had already been hit by a torpedo but had signalled, *'Yamashiro* has one torpedo hit, not handicapped in ability to fight.' Then another destroyer torpedo hit her and slowed her down to 5 kts, and three of her six twin 356-mm (14-in) turrets had already been knocked out.

Oldendorf now turned his Battle Line to enable him to cross Nishimura's 'T', the classic battleship manoeuvre. No ship could withstand such a pounding, and eyewitnesses described the *Yamashiro* as burning like a furnace. She finally rolled over and sank with all hands.

There was nothing left for the battleships to do, for the destroyers and aircraft finished off Shima's 2nd Striking Force, sinking all surviving cruisers and destroyers except the *Shigure.*

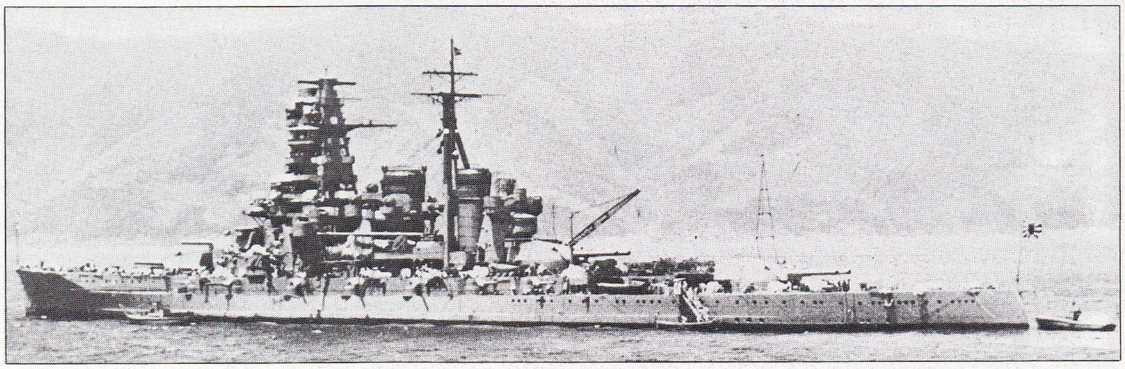


The USS Pennsylvania *leads another old battleship of the 'Colorado' class and three heavy cruisers into Lingayen Gulf just before the battle of Leyte Gulf.*

Surigao Strait was the last action between battleships, and it is fitting that it should have culminated in traditional battle-line manoeuvring. It was also the final return payment for Pearl Harbor, for most of the American ships had been seriously damaged or sunk in December 1941. The irony of it all was that radar had finally given the battleship's big guns greatly enhanced accuracy and destructive power, just as the world's navies had decided to stop building them.

JAPAN

IJN *Kirishima*



The Japanese Kirishima***, built as a battle cruiser in 1915, was rebuilt as a fast battleship in the 1930s.***

IJN ***Kirishima*** was the third of four 'Kongo' class battlecruisers built for the Imperial Japanese Navy between 1912 and 1915. Launched in December 1913, the *Kirishima* was completed in April 1915.

In common with her sisters *Kirishima* was modernized twice, in 1927-31 and 1934-40. The second modernization transformed her into a fast battleship for escorting carriers, with speed raised from 26 to 30 kts by doubling the horsepower, and with heavier anti-aircraft armament. The original three funnels had been reduced to two in the first reconstruction, and the second gave her a typical 'pagoda' foremast.

When war broke out in December 1941 all four were serving with the 3rd Battle Division, and *Kirishima* and *Hiei* accompanied the force which attacked Pearl Harbor. In June 1942 the *Kirishima* suffered slight damage from air attacks during the Battle of Midway.

With her sister *Hiei* she attacked US forces on Guadalcanal on the night of 12/13 November 1942. The two fast battleships engaged a force of American cruisers, sinking USS *Atlanta*, damaging USS *San Francisco, Juneau, Helena* and *Portland* and sinking the destroyers USS *Barton* and *Laffey* in a confused melée at short range.

Two nights later the Japanese tried again to get a troop convoy through to Guadalcanal and to bombard Henderson Field but ran into an American force. This time the battleships USS *South Dakota* and USS *Washington* were in support, both modern ships with radar, but superior night-fighting techniques enabled the Japanese to plan an ambush in which the American destroyers came off worse. When the light cruiser *Nagara* turned her searchlights on the *South Dakota*, the *Kirishima* immediately opened fire with her 356-mm (14-in) battery, but in the confusion the Japanese lookouts failed to spot the *Washington*, closing from 7300 m (8,000 yards). Five minutes after midnight her deadly 406-mm (16-in) salvoes began to burst around the *Kirishima*, which was quickly overwhelmed by an estimated total of nine 406-mm (16-in) and 40 127-mm (5-in) hits. Seven minutes later she was ablaze, unable to steer and taking on water fast from underwater damage.

Admiral Kondo ordered the destroyers IJN *Asagumo*, IJN *Teruzuki*, and IJN *Samidare* to take off survivors but no attempt was made to save the ship. *Kirishima*'s sea cocks were opened and she sank at 03.23, about 11 km (7 miles) north west of Savo Island.

Specification

IJN *Kirishima* (after second reconstruction)

Displacement: 31,980 tons standard, 36,600 tons full load

Dimensions: length 222.0 m (728 ft 6 in) overall; beam 31.0 m (102 ft 4 in); draught 9.7 m (31 ft 9 in)

Machinery: 4-shaft geared steam turbines delivering 136,000 shp (101415 kW)

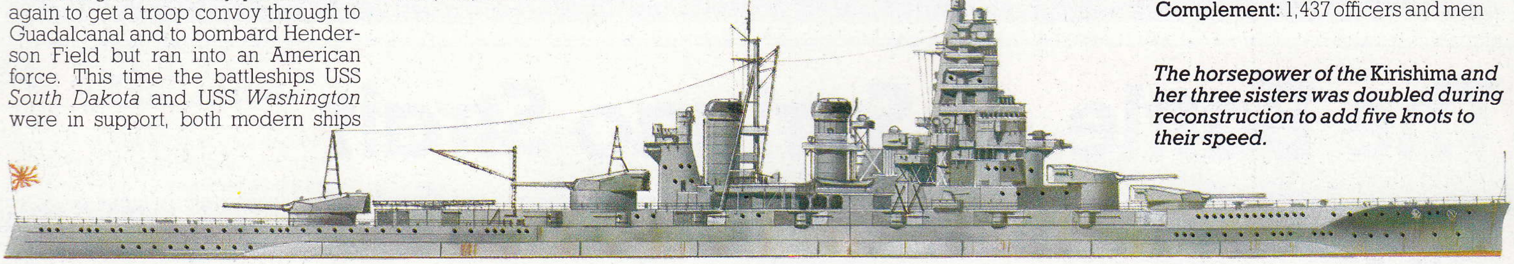
Speed: 30½ kts

Armour: belt 76-203 mm (3-8 in); deck 121 mm (4.75 in); turrets 280 mm (11 in)

Armament: eight 356-mm (14-in), 14 152-mm (6-in), eight 127-mm (5-in) AA, and 20 25-mm (1-in) AA guns

Aircraft: three floatplanes

Complement: 1,437 officers and men



The horsepower of the Kirishima ***and her three sisters was doubled during reconstruction to add five knots to their speed.***

JAPAN

IJN *Yamato*

The Imperial Japanese Navy, pursuing a goal of quality to offset the numerical advantage of the US Navy, started work in 1934 on a design of battleship to outclass any possible opponent. The ships were to be faster, better armoured and have longer-range guns, but the only way in which these qualities could be achieved would be to breach the existing international treaty limits of 35,000 tons and 406-mm (16-in) guns.

The design evolved to meet the requirement displaced 64,000 tons and was armed with nine 460-mm (18.1-in) guns capable of hitting the target at 48 km (30 miles). The protection was on an equally massive scale, with 410-mm (16.14-in) belt armour and 650-mm (25.6-in) face plates on the turrets. To get the ships built without alarming the Americans and British required total secrecy, the theory being that if Japan refused to ratify the next naval treaty in 1936 and had the ships ready by 1940 (when all tonnage limits expired) nobody could accuse the Japanese of cheating. It was also assumed that if the new ships were longer and wider than the locks of the Panama Canal the US Navy would be unable to build battleships of equivalent power, and would be unable to oppose the Japanese Fleet in the Pacific without the enormous expense (and delay) of widening the Panama Canal.

Two ships, IJN ***Yamato*** and IJN ***Musashi***, were ordered under the 3rd Reinforcement Programme of 1937. *Yamato* was laid down in November 1937, launched in August 1940 and completed in December 1941, just over a week after Pearl Harbor. She was Admiral Yamamoto's flagship at the Battle of Midway, but turned back before getting within gun-range of the American carriers. *Yamato* was torpedoed by the USS *Skate* in February 1944 but repairs were completed in time for her to take part in the Battle of the Philippine Sea in June 1944, in Vanguard Force of the 1st Mobile Fleet.

The *Yamato, Musashi* and *Nagato* formed the main strength of Vice-Admiral Kurita's Force 'A' in the Battle of Leyte Gulf, and *Yamato* fired her 460-mm (18.1-in) guns for the first and last time at surface targets when she engaged American light forces. However, poor visibility prevented her from using her monster guns to good effect. Her last sortie was a suicide mission from the Home Islands to Okinawa, but long before she could achieve anything she was sunk on 7 April 1945 by massive air strikes.

Specification

IJN *Yamato*

Displacement: 64,000 tons standard, 69,988 tons full load

Dimensions: length 263.0 m (863 ft) overall; beam 38.9 m (127 ft 9 in); draught 10.45 m (34 ft 3 in)

Machinery: 4-shaft geared steam turbines delivering 150,000 shp (111895 kW)

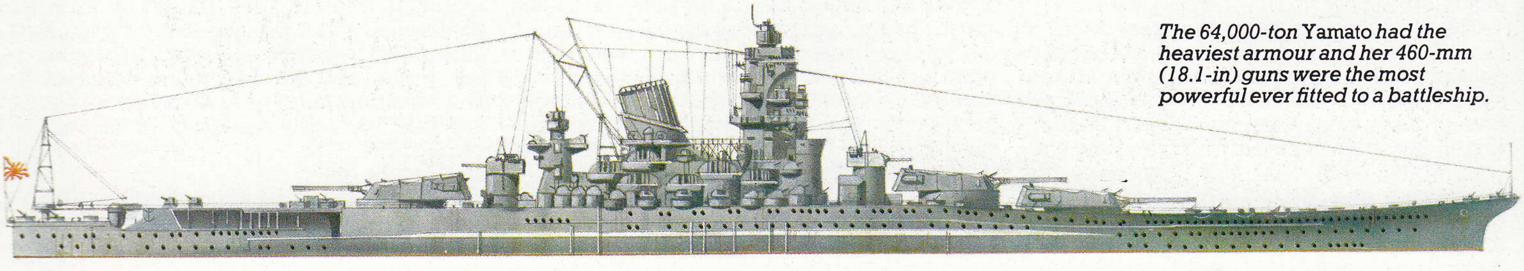
Speed: 27 kts

Armour: belt 100-410 mm (3.94-16.14 in); bulkheads 300-350 mm (11.8-13.78 in); decks 200-230 mm (7.87-9.06 in); barbettes 380-560 mm (14.96-22.05 in); turrets 190-650 mm (7.48-25.6 in); conning tower 75-500 mm (2.95-19.7 in)

Armament: nine 460-mm (18.1-in), 12 155-mm (6.1-in) DP, 12 127-mm (5-in) AA, 24 25-mm AA and four 13-mm (0.52-in) AA guns

Aircraft: six floatplanes

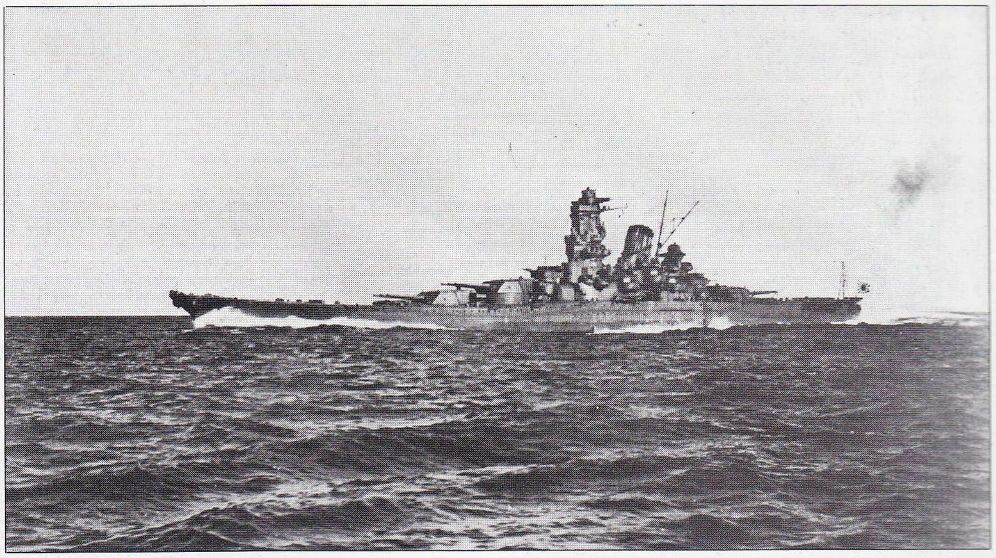
Complement: 2,500 officers and men



The 64,000-ton Yamato ***had the heaviest armour and her 460-mm (18.1-in) guns were the most powerful ever fitted to a battleship.***

'Ten Go' Kamikaze

By April 1945 the Imperial Japanese Navy was impotent in the face of US naval power. To inferfere with the Okinawa landing, the largest battleship ever built was sent on a one-way mission.



The** Yamato **in her heyday in 1941. The uneven deckline was characteristic of Japanese warships, and was adopted to reduce damage from blast.

The American landings on Okinawa in April 1945 signalled the end for Japan, but as a last desperate effort to delay the inevitable, the battleship IJN *Yamato* was ordered to make a sortie from Kyushu. She was to be the bait to lure US carrier aircraft away from Okinawa, leaving it vulnerable to a large-scale *kamikaze* attack on the transports and warships. In the unlikely event that the battleship reached Okinawa, she had orders to beach herself and use her 460-mm (18.1-in) guns in support of the defenders: so desperate was the situation that there was sufficient oil fuel only for a one-way trip.

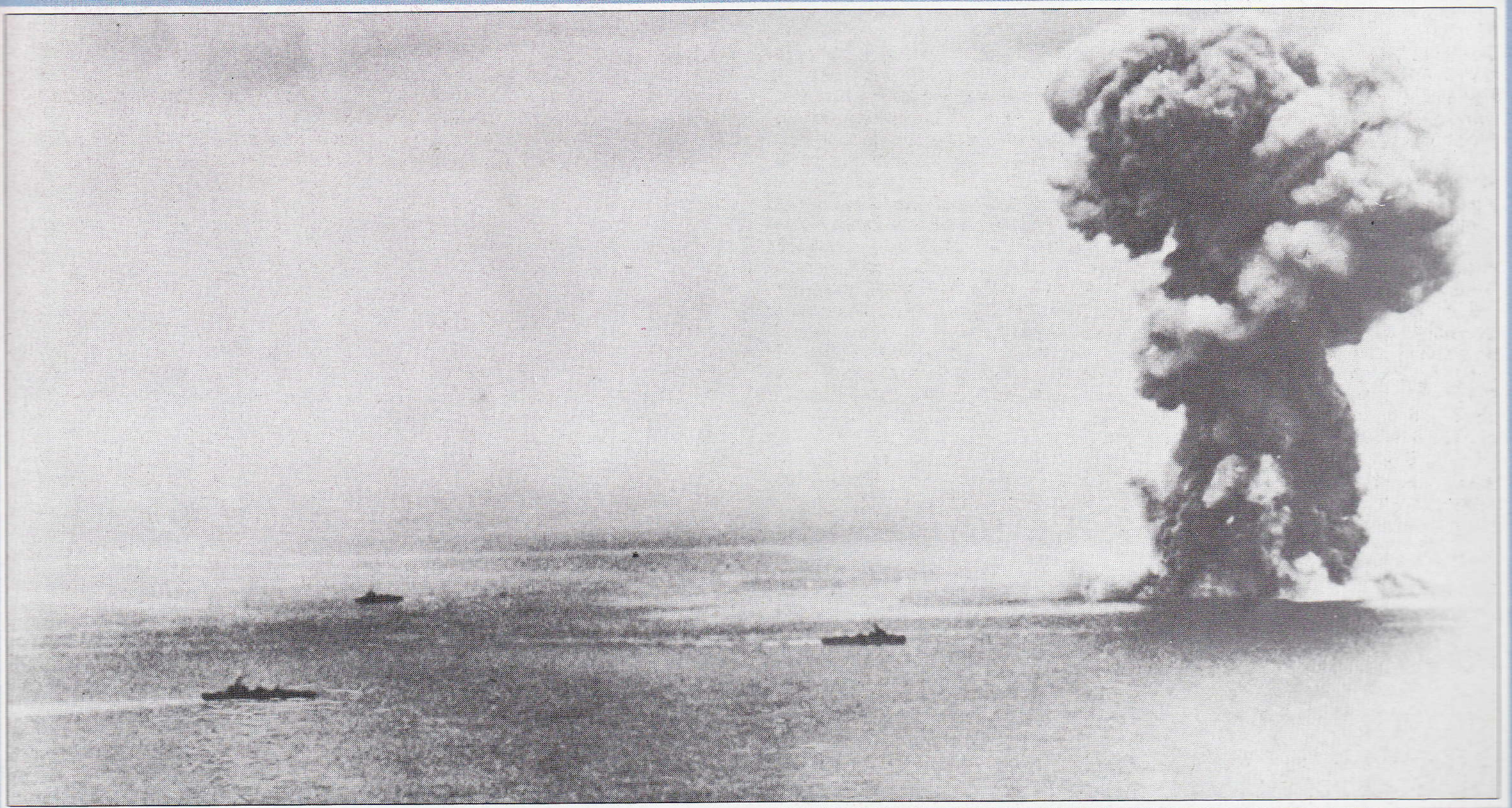
The force for the operation, codenamed *'Ten Go'*, comprised the *Yamato*, the light cruiser IJN *Yahagi* and eight destroyers. It left Yokuyama Bay at 16.00 on 6 April, but in the course of the next morning one of the destroyers turned back with engine trouble. The ships were in a circular formation, with *Yamato* in the centre, when at 11.30 on 7 April they were sighted by an American floatplane. Shortly afterwards an estimated 250 US carrier strike aircraft were reported to be heading for the *'Ten Go'* force, and at 12.20 the *Yamato* reported that she could see many aircraft about 30000 m (32,800 yards) off her port bow. Everyone in the Japanese force knew that the end could not be avoided, but there was an air of grim determination as the vast air strike started its attacking runs.

After a short lull, when a rain squall blanketed the ships, the battle began at 12.32 when the *'Ten Go'* force was only 280 km (175 miles) south of Kyushu. The first ship to go was the *Yahagi*, which was torpedoed, bombed and strafed. She was followed by the destroyer IJN *Isokaze*. The first bomb hit the *Yamato* at 12.40, and 10 minutes later the first torpedoes hit her on the port side. Another eight torpedoes hit on the port side, and two more on the starboard side, causing progressive flooding which the damage control parties could not control.

By 14.05 it was clear that counter-flooding could not right the vessel and 'Abandon Ship' was piped. A final torpedo struck at 14.17, accelerating the list to 20°. Suddenly the giant hull erupted in a huge pillar of smoke – fires had probably reached a magazine. The surviving destroyers moved in to pick up survivors, but 2,498 officers and men went down with their ship. After all survivors had been picked up by IJN *Kasumi*, IJN *Fuyuzuki* fired a 'Long Lance' torpedo into the wrecked destroyer and headed back to base with the other survivors, IJN *Hatsushimo, Suzutsuki* and *Yukikaze*.

The *'Ten Go'* operation was a futile sacrifice of brave men: in all 3,665 men had died, 446 in the *Yahagi* and 721 in the destroyers, in addition to the majority of the *Yamato*'s company. The supreme irony was that the big *kamikaze* raid on the Okinawa invasion fleet had been equally futile. Only 114 aircraft could be mustered, and they had managed to damage only one carrier, an old battleship and a destroyer. With the *Yamato* went the last of the Imperial Japanese Navy.

A pall of smoke marks the grave of the** Yamato, **sunk in the East China Sea on 7 April 1945 by massive carrier strikes.



FRANCE

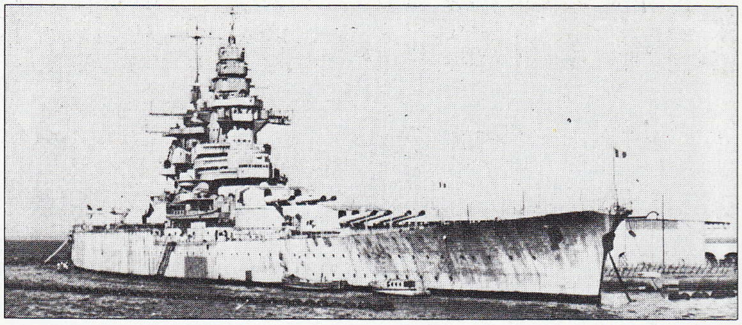
Richelieu

To maintain its position relative to other major navies, the French navy authorized two 35,000-ton battleships in 1935, to be named **Richelieu** and *Jean Bart*. They were basically enlarged editions of the 26,000-ton battlecruisers *Dunkerque* and *Strasbourg*, also with high speed and two quadruple turrets forward, but much heavier armament and protection.

The design which emerged was unique, with two large quadruple turrets well forward and widely spaced, and an ugly backward-angled funnel forming part of the after superstructure. They were, however, powerful and well-protected ships and their only drawback was low endurance, a result of being intended to operate primarily in the Mediterranean.

The *Richelieu* bore a charmed life, for she was running her trials at Brest when France fell in June 1940, but managed to escape to North Africa. She went to Dakar, and escaped without damage when a British motor launch tried to drop four depth charges under her stern. Early on the morning of 8 July she was attacked by six Fairey Swordfish torpedo bombers from HMS *Hermes*. One 457-mm (18-in) torpedo struck the *Richelieu*'s stern, and flooding caused her to settle on the bottom of the harbour. However, her 380-mm (15-in) guns were still functioning, and accurate salvoes helped to defeat an attack by British and Free French forces in September despite the fact that the ship was unable to steam, and that three of her guns were unable to fire.

As soon as her refit was completed the ship sailed to the UK via Toulon, and joined the Home Fleet at Scapa Flow, covering convoys to Murmansk and working up to full efficiency. In March 1944 she left the Home Fleet and was sent to Trincomalee to serve with the Eastern Fleet. She saw no great battles but took part in a number of bombardments and came under air attack on several occasions. Apart from a short refit at Casablanca from October 1944 to January 1945 she remained in the East Indies until October 1945, when she sailed for Indo-China.



The incomplete* Richelieu *escaped from Brest to Dakar in June 1940, where she was damaged by a British attack.

Specification

Richelieu

Displacement: 41,000 tons standard, 47,500 tons full load

Dimensions: length 247.9 m (813 ft 4 in) overall; beam 33.0 m (108 ft 3 in); draught 9.7 m (31 ft 10 in)

Machinery: 4-shaft geared steam turbines delivering 150,000 shp (111855 kw)

Speed: 30 kts

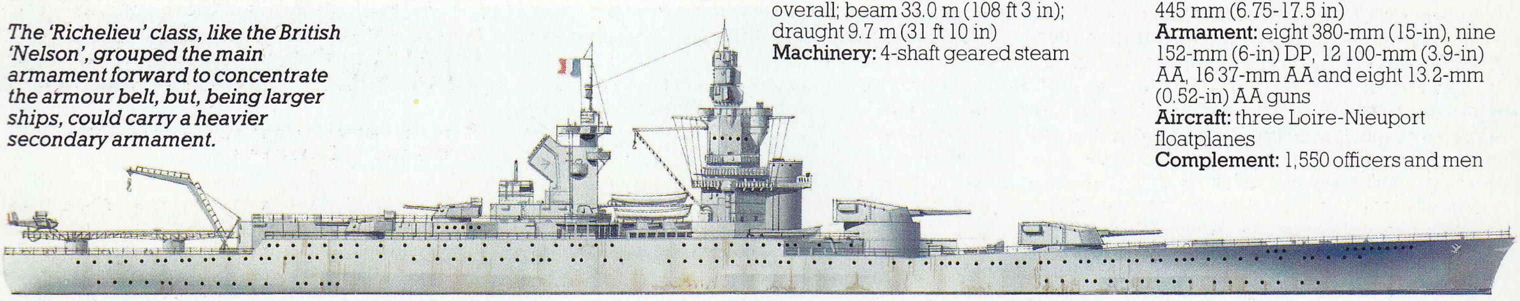
Armour: belt 343 mm (13.5 in); decks 50-170 mm (2-6.75 in); turrets 170-445 mm (6.75-17.5 in)

Armament: eight 380-mm (15-in), nine 152-mm (6-in) DP, 12 100-mm (3.9-in) AA, 16 37-mm AA and eight 13.2-mm (0.52-in) AA guns

Aircraft: three Loire-Nieuport floatplanes

Complement: 1,550 officers and men

The 'Richelieu' class, like the British 'Nelson', grouped the main armament forward to concentrate the armour belt, but, being larger ships, could carry a heavier secondary armament.



ITALY

Vittorio Veneto

With her sister *Littorio*, the **Vittorio Veneto** formed the spearhead of the Italian navy at the outbreak of World War II, having been completed in April and May 1940 respectively. Both formed the 9th Division at Taranto, where it was hoped they would deter the British Mediterranean Fleet by virtue of their high speed and heavy armament.

Both ships put to sea several times in response to British operations, but they missed the Battle of Calabria on 9 July 1940. The *Vittorio Veneto* was lucky not to be damaged during the Fleet air raid on Taranto in November 1940, but she was the direct cause of the next disaster which overtook the Italian navy, the Battle of Matapan. On 28 March 1941 while taking part in a sweep against the British convoys evacuating troops from Greece to Alexandria and Crete, the *Vittorio Veneto* was hit by a torpedo dropped by one of HMS *Formidable*'s Fairey Albacores. The 457-mm (18-in) torpedo hit abaft 'Y' turret on the port side at 15.21. Serious flooding followed and power was lost on the port outer propeller shaft, but she could still steam, and limped away to the north west.

More British attacks followed at dusk, missing the battleship but hitting one of her escorting cruisers, the *Pola*. The engineers and damage control parties worked hard to stem the flooding, and by 20.34 the *Vittorio Veneto*'s speed had increased to 19 kts, and she was able to make her way back to Taranto for repairs, leaving the *Pola* and two sisters to be destroyed by the British Mediterranean fleet during the night.

In December 1941 the *Vittorio Veneto* was hit by a torpedo from the British submarine HMS *Urge*, and needed another three months in dock. She joined the *Littorio* for an operation against a British convoy in mid-June 1942, but the Italians were losing the initiative, and thereafter she spent most of her time in La Spezia as Taranto was under constant air attack. On 5 June 1943 she was damaged by Allied bombers, and the following September she joined the melancholy line which steamed to Malta to surrender to the British.

The *Vittorio Veneto* was interned at Alexandria while the Allies debated the future of all Italian warships. There was talk of 'tropicalizing' the three 'Littorio' class battleships as fast carrier escorts for the Pacific but they lacked endurance, and although they returned to Italy in 1946 they were not permitted to be incorporated into the post-war Italian Navy, being sold for scrap in 1951.

Specification

Vittorio Veneto

Displacement: 41,700 tons standard, 45,460 tons full load

Dimensions: 237.8 m (780 ft) overall; beam 32.9 m (108 ft); draught 10.5 m (34 ft 5 in)

Machinery: 4-shaft geared steam turbines delivering 128,000 shp (95450 kW)

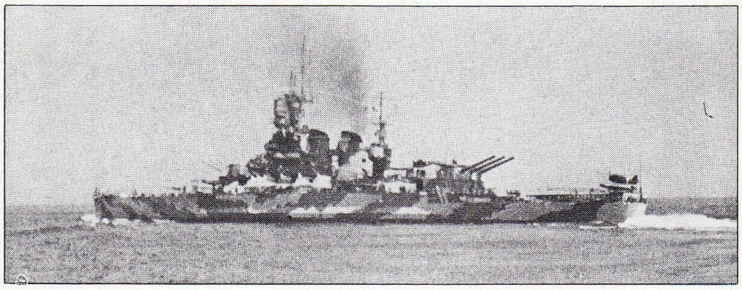
Speed: 30 kts

Armour: belt 60-345 mm (2.4-13.6 in); decks 165 mm (6.4 in); turrets and barbettes 200-280 mm (7.9-11 in)

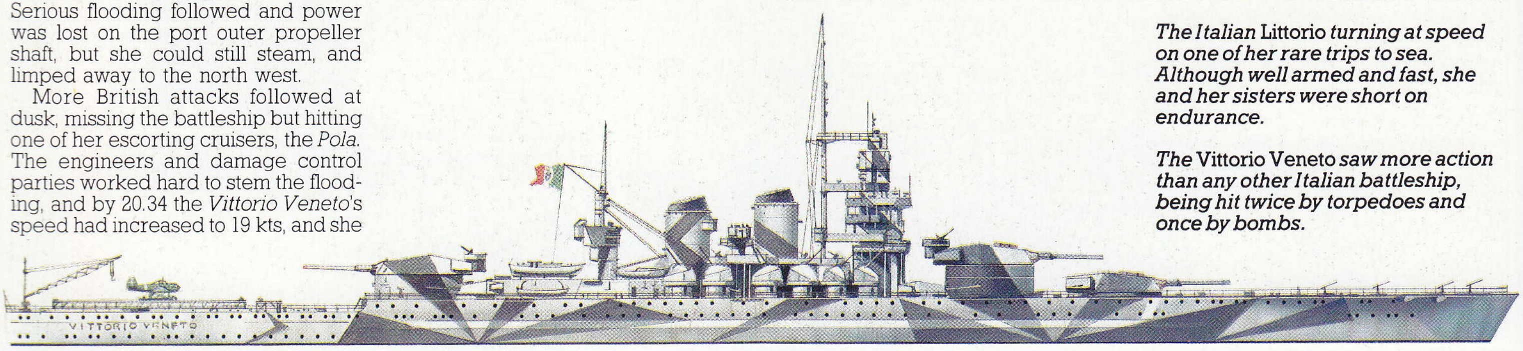
Armament: nine 381-mm (15-in), 12 152-mm (6-in), 12 90-mm (3.5-in) AA, 20 37-mm AA and 16 20-mm AA guns

Aircraft: three floatplanes

Complement: 1,872 officers and men



The Italian* Littorio *turning at speed on one of her rare trips to sea. Although well armed and fast, she and her sisters were short on endurance.



The* Vittorio Veneto *saw more action than any other Italian battleship, being hit twice by torpedoes and once by bombs.

Israeli Army and Navy

Israeli Defence Force/Army

The Israeli army is one of the most remarkable the world has ever seen. It is formed from a modern form of armed militia, and in numbers alone is small. Despite this the army was perhaps the primary force behind the establishment of the nation of Israel in 1948-9, and on three occasions since then it has taken on the military might of the Arab world, both voluntarily and involuntarily, and demonstrated an aptitude for modern armoured warfare at which the rest of the military world can only marvel.

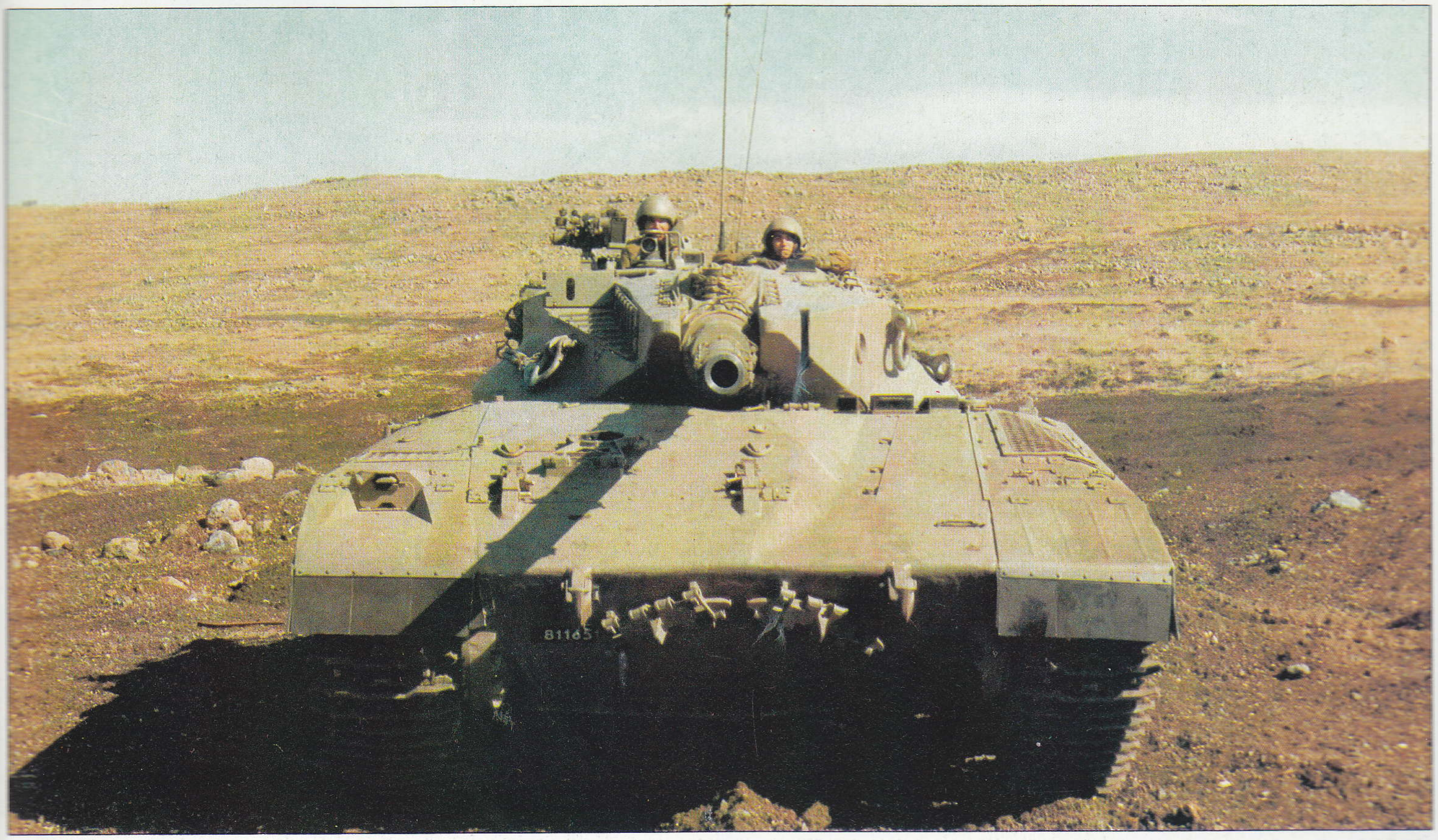
The Israeli army has become battle-hardened, experienced and as far away from the desired peace as ever. Today a tiny nation only some 4,100,000 in population has to maintain an army which has a standing strength of over 135,000 at any one time. Of these 110,000 are conscripts, with only a small regular cadre to administer and train the ever-changing sea of faces that forms the strength of the army, for with the reserves the Israeli army is 450,000 strong. This total includes some local and civil defence units but it is still a terrific burden on the shaky economy of a small nation. Almost every member of the population has to spend some of his or her time with the armed forces, and the army takes the bulk of conscription. Every Israeli male (Jewish or Druze) has to spend 39 months full-time in uniform and every Israeli female 24 months. In practice there are exceptions (mainly religious) to this conscription, but even then some other form of service is required. Once the conscription period is passed the men stay either on the reserves (or some other form of service that involves an annual training period with the army), and after that they pass to the local defence militias or other defence organizations guarding such sensitive installations as oil depots and transport facilities. Thus the Israeli spends a fair amount of his life in uniform and is on almost constant call in emergency.

The Israeli army depends for its main land-based strike force upon 11 armoured divisions of 33 armoured brigades; each of the latter has three tank battalions and one mechanized infantry battalion. This involves a fairly massive investment in tanks, and the Israelis have no fewer than 3,600 of them. The most numerous type is the Centurion, of which there are 1,100 updated and armed with a 105-mm (4.13-in) main gun. Then there are 1,010 M60s and 650 M48s, most of which also have 105-mm (4.13-in) guns, and to add to these there is the locally developed and produced Merkava. To date there are about 250 of these in service and they have alreay proved to be remarkable vehicles exactly suited to local conditions. Previous wars have also added to the Israeli tank park in the form of 150 ex-Soviet T-62s and a further 440 T-54s and T-55s, but these are normally issued to the reserve units.

The mechanized infantry units ride into battle on a variety of APCs, but the bulk of them comes from the 4,000 or so M113s delivered from the USA. Modernized American M2 and M3 half-tracks are still used extensively, as are numerous types of ex-Warsaw Pact APCs and lorries. The artillery arm is equipped mainly with American self-propelled artillery such as 48 203-mm (8-in) M110s, 140 175-mm (6.89-in) M107s, and some 300 155-mm (6.1-in) M109s; there are also some Lance missiles. Much of the artillery is towed, many calibres being used in profusion, but the predominant calibres are 105 mm (4.13 in) and 155 mm (6.1 in); some of the towed 155-mm (6.1-in) howitzers are produced locally. A great deal of captured ex-Soviet artillery is in use, and ammunition lines have been established locally to keep ammunition supplies in being; a typical example is the adoption of the Soviet 240-mm (9.45-in) multiple rocket-launcher as a standard Israeli weapon. AA defence is provided by two units with 24 Vulcan/Chaparral gun/missile systems, further capability being added by some 900 20-mm, 30-mm

The Israeli army is highly mechanized, the bulk of its APCs being American M113s.

Israel has used its unrivalled experience in tank warfare to produce the Merkava.



and 40-mm guns and by Redeye SAMs.

The Israeli army now has much of its requirements produced locally by a state-run defence industry. The infantry uses as its standard rifle the 5.56-mm or 7.62-mm Galil, a design based on the Soviet AKM. The little Israeli Uzi is now virtually synonymous with sub-machine gun and is sold all over the world. Nearly all ammunition is now produced within Israel, and to this has been added most of the field engineer equipment used by the army.

Although it is established administratively along orthodox military lines, once in action the Israeli army tends to form into ad hoc battle groups under individual commanders. Much use is made of raiding parties formed from commandos and paratroop units, both of which contain some of the elite units within the army, and the general methods depend on speed, surprise and shock force. In defence the best possible use is made of ground and firepower, and tanks are often used rather as infantry strongpoints that can be moved from place to place. In the past the in-service units have usually been in action before the arrival of reservists, who then act either as mobile reserves or as replacements.

At the higher command levels considerable use is now being made of computers as formation simulators. Officers can now command units in action and move them in attack or defence from the confines of a computer building, and great use has been made of the largest of these computers in campaign planning: indeed the advance into the Lebanon was conducted on a computer. Compared with officers from other armies, commanders of the Israeli army tend to be much younger and all of them have at one time or another to pass through the exacting paratroop or commando courses, some doing both. This applies even to armoured formation commanders. Most of the high-level commanders have seen active service in one or other of the various Middle East wars and at times this has tended to colour their actions to such an extent that recent technological advances have been passed over as having no application to the Middle East theatre. This has not stopped the commanders adopting some very advanced items of equipment such as the auxiliary armour plates (to defeat shaped charges) carried on tanks during the advance into Lebanon and the wholesale adoption of TOW anti-tank missiles.

Now that Israel has established a form of peace with her old adversary Egypt, much of the army is stationed along the Syrian border and inside the Lebanon. A further force is maintained along the border with Jordan, and a sizable internal security force has to be maintained in the troublesome West Bank settlement area. Thus the constant drain on Israel's resources is maintained while overall peace is brought no nearer. But for all that, the army is still one of the major influences within Israel, both socially and economically, and the establishment of local industries of all kinds, other than the purely defence-orientated industries, has enabled the state to establish itself in world markets.

In military terms the Israeli army has shown what a small nation can do if it is willing to undertake the considerable social and financial burden that a constant state of military readiness requires, and it has been the source of constant study as to tactics, equipment, methods, training and so on. But it must be remembered that for all its attributes the Israeli army is a force established to defend Israel's interests and borders in a region that has few parallels elsewhere, and that many of the 'lessons' of the various Middle East wars would produce very different results if attempted elsewhere.

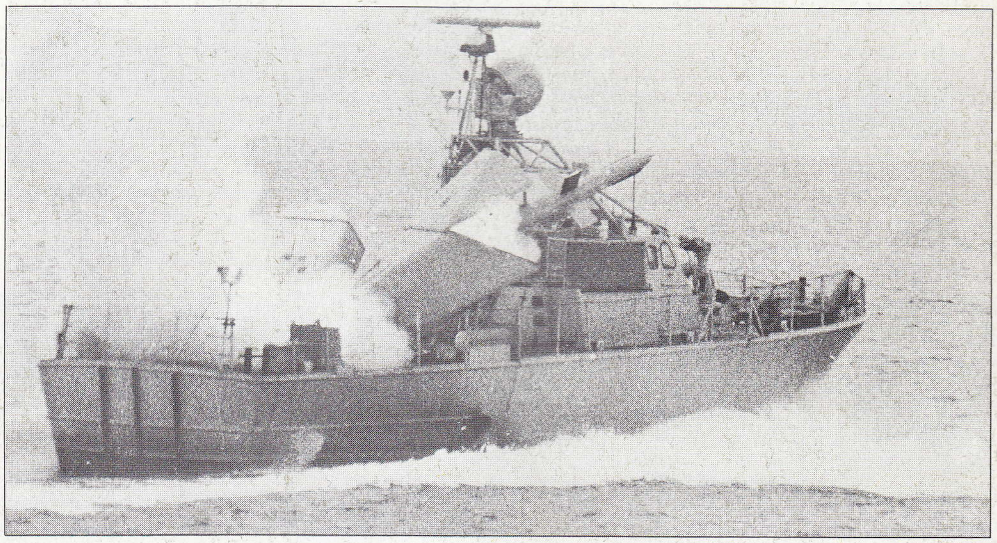
Order of Battle

11 armoured divisions
33 armoured brigades
10 mechanized infantry brigades (five para-trained)
12 border infantry brigades
15 artillery brigades (each of five three-battery battalions)
Various paratroop formations
Commando groups

The Israeli Navy

In its early years the Israeli navy was based largely upon the traditional lines of the Royal Navy with the attendant strategic and tactical concepts of convoy tactics, submarine and anti-submarine warfare. However, in October 1967 the shock caused by the sinking of the destroyer *Eilat* by an Egyptian missile craft accelerated considerably the projected reorgnization of the navy into a modern and well armed force. The Yom Kippur War in October 1973 allowed the new craft to be tested in combat, together with the deception tactics, electronic warfare technology and tactical manoeuvres that had to be evolved for the force to fight a missile war.

From the lessons learnt in this war the Israelis refined their reorganization plans even further. The Gabriel missile was improved to give a longer-range version (Gabriel Mk II) and eventually a fire-and-forget active radar-homing variant (the Gabriel Mk III). In order to engage over-the-horizon targets the American Harpoon long range anti-ship missile was bought and two boats of the 'Reshef' class follow-on, the 'Alia' class (or 'Saar 4.5' class) were fitted with a hangar and flight deck for a Bell JetRanger light helicopter so that they could act as flotilla command and targetting co-ordinator craft. In addition three Israeli Aircraft Industries Sea Scan aircraft were procured for maritime patrol and targetting duties. The increased threat from Arab submarine forces was met by the procurement of specially designed and built variable-depth sonars from the USA for use on the missile boats, the buying of US Mk 46 45-kt 11-km (6.8-mile) range ASW torpedoes, and the acquisition of three coastal submarines to be used in the hunter-killer role armed with American NT37C dual-role 33-kt 20-km (12.4-mile) range torpedoes. To diversify their forces further, the Israelis also ordered two hydrofoils from the USA armed with Gabriel Mk II and Harpoon missiles.



The Israeli navy uses large numbers of fast missile attack craft, such as the Gabriel armed 'Dvora' class.

In 1982 the navy again went to war, primarily in the naval gunfire support and amphibious assault roles to aid the Israeli army in its invasion of Lebanon to drive out the PLO. From this the Israelis learnt more lessons which will be incorporated into their tactics and ship designs. For the future the Israelis are intending to add short-range missile defences (the Barak system) and close-range air-defence guns (20-mm Phalanx and 30-mm TCM30) to their missile craft, and to improve their electronic support measures (ESM) systems. Israel is building a corvette class, suitable for extended ASW missions, missile targetting, and the command and control role with embarked helicopter; it also plans to procure additional submarines in the form of three 1,000-ton boats. The amphibious assault force is to be modernized with new designs of LCT and LST. This considerable effort will continue to mark the Israeli navy as one of the most modern and lethal in the Middle East arena.

Current manpower strength is 800 officers and 5,800 men including 300 commandos; this strength rises to 11,600 with the mobilization of 5,000 reservists. The Israeli navy's main operational bases are Haifa and Ashdod, and there is a repair centre at Eilat.

Order of Battle

Two IKL/Vickers Type 206 patrol submarines
Two 'Saar 5' class guided-missile corvettes (under construction)
Six 'Saar 4.5' or 'Alia' class' fast attack craft (missile)
Eight 'Saar 4' class fast attack craft (missile)
Six 'Saar 3' class fast attack craft (missile)
Six 'Saar 2' class fast attack craft (missile)
Two 'Flagstaff 2' class fast attack hydrofoils (missile), plus another 10 units planned
Two 'Dvora' class fast attack craft (missile)
37 'Dabur' class coastal patrol craft
Three 'Yatush' class coastal patrol craft
One 'Fireflash Model III' class coastal patrol craft
Three 'LSM1' class landing ships medium
Three 'Ash' class landing craft tank
Three 'LC' class landing craft tank
Three 'LCM' type landing craft medium
Two 'Sealand Mk III' type hovercraft
One training ship
Two 'Bat Yam' class transports
One light forces tender
One 'Yar' class training craft
Four 'Kemda' class coast-guard/marine police patrol boats